MANUFACTURING RATIONALIZATION TRENDS in MANITOBA

Report of the Manitoba Economic Development Advisory Board

September 1976

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Economic Development
Advisory Board

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411-428 Portage Avenue

Winnipeg, Manitoba

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THE MANITOBA ECONOMIC DEVELOPMENT ADVISORY BOARD

The Manitoba Economic Development Advisory Board came into existence in 1969 and since then has provided a useful channel of communication on economic matters between the public and the government. It has done this by both conducting a series of conferences and carrying out independent research. The views expressed at the public meetings have been published as proceedings and are available on request. The Board research program has also provided insights into the Manitoba economy which are proving useful to both government planners and University teachers. The Board is pleased to present this latest work and trusts that the findings and recommendations will provide a useful framework for decision-makers.

The members of the Board have been selected from the public at large to provide a balanced viewpoint on matters affecting the Manitoba economy. The members during the 1975/76 year were:

- Mr. Leonard Remis (Chairman)
- Mr. Isaac Beaulieu: Band Chief, Sandy Bay Reserve
- Mr. Al Cerilli: Representative, Canadian Brotherhood of of Railway Transport and General Workers
- Mr. Clyde R. McBain: President of Ancast Industries Ltd.
- Mr. John McGuire Research Director and Executive Secretary, Assistant Professor of Economics University of Manitoba - (on leave of absence)
- Dr. Paul Phillips: Associate Professor of Economics University of Manitoba
- Mr. William E. Shields: Vice-President, The Clarkson Company Limited
- Dr. Om. P. Tangri: Professor of Agricultural Economics, University of Manitoba
- Mr. Lewis D. Whitehead: Editor and Publisher of the Brandon Sun.

FOREWORD

The role played by governments in shaping economic activity is increasing throughout the world. The extent of involvement varies from region to region but there is little doubt that the pace is accelerating everywhere. In countries with authoritarian governments there is almost total planning and control. Even in democratic Europe, where the free market is still substantial, the growth of the government sector is only limited by political considerations How true is this in North America? An examination of the distribution of the G N P in the United States and Canada seems to indicate that the intrusion of governments into the market place has followed the same direction but at a lesser pace. In Canada, however, the trend is well in advance of the United States. Both Federal and Provincial governments have been increasing their activity in the economic affairs of the nation, directly and indirectly.

Opposition to government expansion now comes not only from the commercial and industrial sectors (with their strong vested interests and long tradition of the free economy) but also from the growing middle class who feel that they are contributing unnecessarily to government programs and are facing an erosion of real income as taxes continue to rise. In addition, organized labor now sees government participation as a threat to the bargaining process. In the face of this mounting opposition is it likely that governments will reverse the trend? The answer is, probably not. Governments have an immediate and urgent concern in the stability and growth of the economy if they are to continue their programs of equity and income distribution. Given then the objective of a more equitable society and the imperfections of the market system, it is little wonder that governments have opted for intervention.

The foregoing is neither new nor startling but is re-stated in order to emphasize the pervasiveness of government in economic affairs. Such being the case, it is the responsibility of government officials to utilize, in the most efficient manner possible, the resources placed in their hands by the public. This now calls for a degree of planning and management heretofore not envisaged by politicians and public servants.

The research presented here is directed to those in charge of economic planning for the Manitoba government. This is not to say that government officials do not plan, but subject to the need to appeal to the electorate at least every four years, democratic governments to tend to favour a short term outlook. What this study does is lay some of the groundwork for historically based long term planning by outlining the realities of Manitoba's economic profile. It also presents a methodology by which a base line for future study may be established. Before the objective to any plan can be articulated a starting point must be layed down. In our present study we have attempted to show how this can be done.

With Manufacturing Rationalization in Manitoba, the Economic Development Advisory Board has produced its second major study of the Manitoba Economy. Its first paper, Manpower Issues in Manitoba, has been widely distributed in the Province and has been well received by government officials and university departments studying manpower problems. It is hoped that the present paper will also prove to have an impact on government planners.

The research presented herewith was conceived and carried out, with the approval of the Board, by Research Director, John McGuire with the assistance of Carole Swan. Although the findings and recommendations are the work of the researchers, the Board has reviewed the manuscript and had given its unanimous support to the report. It also must be noted that this work has gained in clarity and lucidity through the contributions of Edna Magel and Donna Phillips.

Leonard Remis
Chairman

PART ONE

SCOPE, METHOD AND FINDINGS:

A SUMMARY PAPER

PART ONE

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A) Overview

I INTRODUCTION

If economic planning is an essential function of government, then industrial planning must occupy a central position in any economic plan. It is the objective of this study to present a methodology whereby long term trends in actual industrial development can be identified. From an analysis of these trends it is then possible to pinpoint those factors which impede industrial development from proceeding along lines consistent with the public interest. The government is thus able to devise policies and programs intended to remove these impediments to growth and development. It is also within the scope of this research to assess Manitoba's industrial performance and to isolate these areas with the greatest potential for economic growth and development.

It should, however, be pointed out that no industrial plan, no matter how well conceived, can function by itself. If industrial planning is to be successful, that is not merely 'spin it wheels' or indulge in 'ad hocery', it must be part of a general over-all plan involving many government departments and agencies. From experience gained in discussing the previous year's research work, Manpower Issues in Manitoba, with various government agencies and departments and with groups in the private sector, it became apparent that people charged with the authority to devise and implement government manpower policy could not proceed too far with their objectives before it became necessary to co-ordinate their activity with other sectors of the government such as Industry and Commerce, Education, Health and Social Welfare and Agriculture.Logic would dictate that these other sectors would not be able to proceed too far with their objectives until they knew what manpower policy was. It is therefore to the government as a whole that this study is directed.

Given the existing political-economic system in Canada, it is simply not possible for Manitoba to have an economic plan similar to the plans prevalent in the centrally planned economies. Nor do we consider it fruitful to follow the efforts of the Economic Council of Canada to specify economic targets in terms of growth, unemployment, price stability and other indices. Instead the Manitoba Economic Development Advisory Board recommends a type of planning which recognizes that the current economic system is constantly changing, that there are forces within the system that continuously rationalize both the structure and the behaviour of the economy. If the government, can detect the direction and causes of these rationalizing forces, it would be in a better position to influence the direction of change.

As argued in the section of this introductory paper entitled "An Organic Analogy of the Economy', broad economic trends exist in Manitoba which are consistent with national and even international trends. To implement policy without being aware of these trends would be foolhardy. To implement policies designed to achieve ends that run counter to these trends would in all probability doom the policies to failure. However, the general trends are broad enough that many variants are possible and thus there is room for policy options to yield important results. The strategy is to know our provincial development objectives and the broad economic trends and their determinants well enough to be able to implement policies that use the weight of the broad economic trends to achieve the highest possible level of performance in terms of our own development goals.

In the economic discipline it is common to identify the two basic functions of any economic system as the production of wealth and the distribution of wealth. The primary purpose of the type of planning suggested by this report would be to identify ways the government could influence the rationalizing process of wealth production within the existing political-economic system. (Of course, the production and distribution of wealth are interdependent and the planning process could also be used as an aid in policy formation with respect to distribution.) The emphasis of policy measures derived from the planning process would be to improve the efficiency of the existing system in terms of its ability to co-ordinate private rationalizing activity. The objective of government would be not to run the economy but to influence the system that runs the economy by either altering structural features of the economy or imposing rules to alter the behaviour of its citizens.

It is further contended that the long term planning activity of the government should have the following features. First, the public interest should be identified; the present Government of Manitoba is well aware of the necessity of this function, as indicated by Guidelines for the Seventies. Second, the trends of change should be monitored and evaluated in terms of how much the rationalizing activity of the community is in the public interest.

Third, the workings of the evolutionary forces must be understood well enough that the major causes of the deviations of the actual changes from the desired trend can be detected. Fourth, a method should exist that can evaluate the performance of any government policy introduced to alter the rationalizing process. Fifth, even though the plan should have at least a five to ten year perspective, it should be reviewed and revised annually because of the evolutionary nature of change. In essence the five features involve attempts to answer three questions: what is desirable; what is actually happening and why; and what can be done to narrow any differences between what is desirable and what is happening?

The research in the following papers of this report has two main objectives. In the first place, it is meant to provide one possible research methodology to identify basic and historic trends. Secondly, the methodology will be used to indicate what direction further research should take. The method is essentially a scanning process that allows us to identify those sectors of the economy which are weak in Manitoba. Further intensive studies of these areas would then be necessary. No suggestions or research will be made about what the public interest is or what government policy should be except in very broad terms. For instance, it is recommended that the Provincial Government initiate a program of long term planning.

It must be emphasized again that the main purpose of this study is to illustrate the practicality and fruitfulness of a method which enables us to scan the economy and to identify, in a preliminary way, areas where the structural rationalizing process is not performing optimally. Further intensive study of these identified sectors would be required before any definite conclusions could be made or policies could be prescribed. The scanning process is designed to be only the preliminary stage of investigation to answer the question: what is actually happening and why? Several potential problem areas have been identified for illustrative purposes. The reliability of the actual identification has to be viewed with suspicion because of our inability to acquire more recent data. However, this weakness does not allow one to dismiss the actual findings completely because the method attempts to study long term underlying trends as well as cyclical trends. Thus if the current performance, say, of an identified problem industry differs drastically from its long term trends, it is still necessary to determine whether or not the change is a fundamental one or an aberration.

The scanning process is not perfect and there are ways in which it can easily be made more sophisticated. However, the basic approach is sound if the following two arguments are accepted. First, the purposes of a provincial planning program as described in this paper (see Page 3) are valid. Second, to fulfill the optimal requirements of the plan, every industry would have to be monitored and evaluated continuously. However, such complete monitoring and evaluation would be too costly. As a second best alternative some technique would need to be developed to rationally select the industries where further study would yield the most benefit.

There is no generally accepted definition of what economic development is or should be. However, sustained economic growth accompanied by structural change have been two of the more commonly recognized features of the modern day industrialized economies. Logically then, trends in relative growth rates and the resulting shifts in the relative size of the various sectors of the economy would be an obvious way to begin observing the structural rationalization process. In this study, particular emphasis was placed upon the manufacturing division not only because it is an important component of the economy but because the available data for this divison are better. More specifically, emphasis was put on two types of trends: i) the relative industrial growth rates of provinces and shifts in their mix of economic activity, and ii) the relative growth rates of manufacturing industries at the plant level both nationally and provincially. In other words, the research work is primarily concerned with the influence of growth on the geographic location of industry. Other types of growth and structural trends, however, need to be analysed if the evolutionary pattern of change is to be fully understood.

Employment was the primary unit of measurement beceause employment data are more comprehensive than other measures of growth. In some instances growth could be measured in terms of value added or shipments, and where appropriate these other measures were used. In some cases where it was possible, the analysis of trends could have been done with other measures besides employment, and the results compared. The comparisons would have been useful additional information. However, because of time and staff constraints these comparisons were not made.

II AN ORGANIC ANALOGY OF THE ECONOMY

The economy can be viewed as a living organism; as such it has both an anatomical structure and a physiology. Like all living things it is constantly evolving as it attempts to adapt itself to its environment. Also, like all living things, its activity can change the environment, a characteristic that is too often forgotten or ignored. Perhaps more so than other living things, the economy has the ability to alter its anatomy and its physiology through self-determination; that is,the human element in the economy consciously acts on the environment, rather than merely reacting or adapting to it. What factors determine this self-determination or, as J. R. Commons calls it, this "collective will" (see J. R. Commons, The Economics of Collective Action, New York: MacMillan Company, 1950 or K. H. Parsons, "John R. Commons' Point of View", Journal of Land and Public Utility Economics, 1942), and how this collective will is translated into action, is a complicated area of study, an area which is beyond the scope of this research.

The analogy of an economy to a living organism is a useful one. It allows one to think of the economy as constantly evolving. However, unlike other living organisms, the death of an economy is not inevitable. It has the ability to regenerate and to completely transform itself. (With respect to this property, an analogy to a species rather than to an individual organism would be more appropriate). The direction of evolution is influenced and limited by factors within i) its environment, ii) its anatomy, iii) its physiology and iv) its collective will. It is complicated to discuss the process of change because the factors within these four categories are inter-dependent; the whole process of change cannot be viewed as a simple set of uni-directional cause and effect relationships.

One can postulate that change is the net result of thousands of individual actions all designed to rationalize either the anatomy or the physiology of the economy in a way that is more favourable to the individual unit of action or active agent. Active agents can be defined as both individuals and associations of individuals. (Two types of structural rationalization activity are: the re-grouping of individuals and the reformulating of alliances between associations) The actual change need not and probably never does correspond to the intended change of each of the active agents, simply because the rationalizing activity of the agents will inter-react. It is possible to argue however, that the results of the collective rationalization activity reflects the changes desired by the collective will. The collective will could be defined as the synthesis of the individual wills. This definition is simplistic and not a true representation of what Commons meant by the term. Commons' definition is more subtle, more obtuse and far more profound.

Continuous change in the economic system, it can be argued, is due to the following reasons. Even if the collective rationalization activity in any one time period moves the system closer to the goals of the collective will, it never achieves the goals completely. It can never achieve the goals of the collective will completely because the collective will is never a complete synthesis of the individual wills. Therefore, the collective will consists of the goals that have been synthesized but also the remaining goals that have not been synthesized. This statement modifies the definition of collective will given above but the modification draws the definition closer to J. R. Commons' conception of the collective will. The unsynthesized goals, because they have not been synthesized, conflict with each other and probably with the synthesized goals as well. In addition, and it must be emphasized, the goals themselves, (the collective will) are constantly evolving due in part to the rationalizing activity.

There are three other reasons why there will always be evolution in the structure (anatomy) and the functioning (physiology) of an economic system. First, due to mis-information or ignorance on the part of the individual active agents about the environment, the anatomy and the physiology of the economic system, the collective rationalization activity need not bring about change that reflects the collective will. Indeed the outcome could place the community in a worse position than it was before the change in terms of its collective will or goals.* Clearly under such circumstances, the economic system will generate further economic rationalization activity. Second, and for the same reasons, (mis-information and ignorance) it is quite possible that the collective will does not reflect the public interest. (As an aside, in this context, Adam Smith's concept of the 'Natural Order' - often referred to as the 'Invisible Hand' is wrong. There is an 'Invisible Hand' type mechanism operating within the system but it is neither omnipotent nor infallible. The 'Invisible Hand' is nothing more than the outcome of the collective will. The outcome of a society's collective desires and actions is not always in that society's own interests. The argument that 'not only what will be, will be but will be best' reflects an attitude towards the market system and democracy which is untenable.) To resume, when the collective will errs, sooner or later it will discover its error and more change will be generated. Third, a distinction must be made between the collective will, the collective desire, and the public interest. Collective desire is a synthesis of individual desire;collective will is the collective desire weighted by the relative power of the individual agents to command the allocation of resources and distribution of product. Therefore, even if the goals of the collective will are attained, change will still occur through efforts to re-align the power base. Such efforts need not be in the public interest.

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* Circumstances which meet the conditions of the 'Prisoner's Dilemma' could quite easily lead to such an outcome. The 'Prisoner's Dilemma' refers to circumstances such that if a person acts in a socially responsible way he alone will be hurt unless everybody else acts in a socially responsible way. Yet if he and everyone else does not act in a socially responsible way everyone will be hurt.

The purpose of this discussion is to justify several assertions which will serve as the underlying assumptions of this research. First, there is always change and it is evolutionary rather than revolutionary. Second, the evolutionary trends are not perfectly predictable but it is possible to identify major trends that are not easily altered. History reduces the number of options for change at any point in time and the actual set of options chosen depends upon the inter-actions of the forces classified by the four categories of economic environment, the economy's anatomy or structure, the economy's physiology or functioning, and the collective will. The outcome of the inter-actions of these forces is not perfectly predictable but because of the strong influence of history, that is, the actual state of affairs at the point of time under consideration due to past inter-actions of the forces within the four categories, it is highly probable that the change that occurs will be consistent with several broad historic trends. For the outcome to be inconsistent with the broad historic trends would mean that there have been revolutionary not evolutionary changes, something that we have disallowed by our first assumption.

Third, the outcome of the inter-action of the evolutionary forces is not always in the public interest. For instance, the outcome of rationalizing may not have moved the economy in the direction that was intended by the collective will. Also, the collective will may not be in accordance with the collective desire. Finally, the collective will, or the collective desire, or both, may not be in accordance with the public interest. It is quite possible that the collective desire (which is a synthesis of individual desires which in turn are the outcome of largely socially determined values) could lead to human extinction. The same could be said for the collective will. Most people would agree that extinction is not in the public interest. (The economic profession is well known as a haven for Cassandras. One of the most recent Cassandras is Robert Heilbroner; see his book, The Human Prospect). The third assumption, if accepted, implies a necessary role for government. To protect the public interest, the government must involve itself in some form of long term economic planning.

Finally, there is one more inference to be made from our analogy or model that should be stated explicitly. Deviation of the evolutionary trends from the public interest goals is due largely to poor co-ordination machinery. Every day in our economy thousands of individual decisions are made. (Even under a system of central planning, the central authority cannot make all of these decisions.) Clearly some type of efficient system of co-ordination must be set up. The primary goal of government long term planning should be to create an efficient system of co-ordinating activity by either altering structural features (anatomy) or imposing rules to alter behaviour (functioning). The objective of government planning would not be to run the economy but to set up a system that will run the economy. Such a system requires constant monitoring and revision.

III The Dual Economy

R. T. Averitt in his book entitled The Dual Economy: The Dynamics of American Industry Structure (New York, W. W. Norton and Company Inc., 1968.) presented a thesis to explain the evolutionary change in the structure (anatomy) of American industry. In many ways his thesis is quite similar to the one expounded in The New Industrial State by J. K. Galbraith in 1967. In his thesis, Averitt argues that there are in fact two economies within a modern or industrialized national economy. The centre economy is made up of a small number of large corporations that collectively control a disproportionately large amount of the national economy's production; the peripheral economy is made up of a large number of small companies that collectively account for a disproportionately small share of the national economy's production. The properties of the products, the methods of production, the organization of the firms, and the methods of marketing, are completely different in these two sectors. Averitt claims that quite distinct from the dual created by company or firm characteristics, the industries can be classified as key or non-key to the over-all health of the economy. Generally, however, but not always, a centre firm's primary activity is in one or more of the key industries.

Although not central to his argument, it can be easily inferred from his work that both the centre economy and the key industries would tend to be geographically concentrated. In fact, the dual economy and the forces that rationalize an economy into that form of industrial organization could be used to explain the hinterland-heartland phenomena in an industrialized country. In other words, there are three duals which together represent evolutionary nature of an economy like Canada. There is the centre versus the peripheral economy dual, the key versus the non-key industry dual and the heartland-hinterland dual. (It would not be hard to incorporate a fourth dual into this scenario, namely the dual labour market which was the subject of last year's research.) Although all are inter-related, the first dual tends to be concerned more with the organization and ownership of firms, both inter-firm and intra-firm. (Analysis of this dual involves all the factors that determine decision making power and its evolution.) The second dual is product oriented; it is concerned more with the nature of the products of the industries and the resulting inter-relationships of the industries. The third dual is concerned more with the geographic location of the companies and plants. Whether the evolutionary path of each of these duals are analyzed individually or collectively, the four categories of the evolutionary forces as defined in the 'Organic Analogy' section of this paper are still relevant.

IV Structural Rationalization

A structural rationalization measure for the purpose of this study is defined as:

> any measure that is initiated by a decision-making unit, - e.g. a private company or a government agency - and is designed to adjust the structure of industry, either intra-firm or inter-firm, in response to changing economic conditions, and to private and/or social objectives.

Thus structural rationalization measures are deliberate and wilful acts. Within the private sector they must be viewed as competitive acts and as such their effects should, in theory, be regulated by the competitive mechanism. The efficacy of the competitive mechanism as a form of social control over private behaviour depends upon may factors. A list of the factors involved would include such things as: i) whether or not external economies exist, ii) the distribution of discretionary decision-making power, iii) the quality of information available to all relevant decision-makers, and iv) the nature of the rules of acceptable conduct that are imposed either by law or by tradition and custom.* A structural rationalization measure by government, whether it is designed to regulate behaviour and thus influence structure indirectly, is not a competitive act but it will alter the nature of the competitive mechanism.

The structure of an economy has been compared earlier in this paper to the anatomy of a living organism. Structural features include such things as a relative size and location of plants, the relative size and location of firms, the internal organization of a firm (including such things as production techniques used and product range), inter-locking directorates, cartel arrangements, long term contracts and exclusive dealings. Private structural rationalization measures include such things as merger activity, cartelization, entry and exit of firms and intra-firm reorganizations. In short, it consists of any measure which will alter the existing structure. Government rationalization measures include such things as nationalization of industry, changes in subsidy or tax policy and changes in trade practices regulations.

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* For a fuller discussion of the competitive mechanism see Bastiaan De Gaay Fortman, Theory of Competition Policy, (Amsterdam: North-Holland Publishin Company: 1966), Chapters One and Two; and The Economic Council of Canada, Competition Policy - An Interim Report, (Ottawa: Queen's Printer, 1969), Chapter Two.

V The Proposed Method For Identifying Areas of Poor Rationalizing Performance

As discussed earlier, there are three main stages involved in the production of a long term plan (see above, p. 5). First, the public interest needs to be known. Second, the direction of the evolution of the economy and the main determining forces need to be known. Third, government policy needs to be formulated, implemented and evaluated. It must be stressed that none of these three stages can be done on a once and for all basis.

If change is to represent progress it must be in the public interest and if it is, we can say that society has experienced some economic development; progress and economic development are synonymous. Change in itself is not necessarily progress. Work on the third stage of the planning process - the formation, implementation and evaluation of government policy - can only begin after the pattern of evolutionary change has been evaluated in terms of the public interest goals of economic development. The determination of what is the public interest is essentially a political issue. Therefore, the emphasis of this report is on the second stage - the evolution of the economy.

A complete and up-to-date description of the pattern of evolutionary change would require continuous and intensive analysis. Such an analysis would be an expensive undertaking for any provincial government. A more practical alternative would be to devise a set of measures which are easily quantifiable and which can be used to scan the economy periodically and to identify areas where the rationalizing or evolutionary process appears to be performing poorly. These identified areas could then be listed according to some priority and government could select as many of the areas from the list for further analysis as its research resources would allow. The set of scanning measures should be able to identify macro forces which are adversely effecting the rationalizing process of the whole economy as well as individual industries or sectors that appear to be rationalizing poorly.

A possible set of scanning measures is as follows:

i) growth rates of industries for the nation as a whole at the division group and three digit levels of aggregation* plus the growth rates of industries within each province at the division, group and three digit levels of aggregation.

ii) Relative size of each industry for the nation as a whole at the division, group and three digit levels of aggregation plus the relative size of each industry within each province at the division, group and three digit levels of aggregation.

iii) shift-share analysis of each province at the division, group and three digit level of aggregation (see appendix for a technical description of shift-share analysis).

iv) geographic scope of the market for each of the industries.

v) changes in the locational pattern of industries within Manitoba.

A comparison of growth rates is one of the simplest and quickest ways of observing where change (either expansion or contraction) is the greatest. A first indication of poor rationalizing activity is the observation of a growth rate which in a comparative sense is abnormal. One example would be if an industry was growing slowly or even contracting in size in Manitoba but was growing rapidly everywhere else in Canada. Conversely, another example would be the observation of an industry that was growing quickly in Manitoba but was contracting in size everywhere else in Canada. The abnormal patterns do not have to be so stark, however. For instance, an industry in Manitoba may be growing slowly compared to the provincial or over-all national growth rate yet still be growing quickly compared to the rate of growth of that industry elsewhere in Canada.

Knowledge of the relative sizes of industry is necessary for strictly pragmatic reasons. The selection of industries with abnormal growth patterns for further analysis should be influenced by their importance in the economy. The relative size of an industry in the nation, in a province and the relative size of a province's share of that industry's national output are three indications of the importance of the industry to any particular province.

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* Statistics Canada has a Standard Industrial Classification Code (S.I.C.) which first separates total industrial activity into divisions such as Agriculture Construction and Manufacturing. It then further separates the divisions into groups. For instance in the manufacturing division there are twenty groups such as the Food and Beverage Industries Group and the Primary Textile Industries Group. Next, it further separates the groups into individual industries. For instance, in the Food and Beverage Group there are industries such as Poultry Processors and Biscuit Manufacturers. These levels of disaggregation are sometimes referred to as one, two and three digit levels of disaggregation respectively.

Shift-share analysis is a technique which identifies how much the deviation of an industry's provincial growth rate from some norm, say the average growth rate for the nation, is due to factors influencing the industry nationally, and how much of the deviation is due to factors influencing the industry provincially, that is, the industry effect and the regional or competitive effect respectively. The results of shift-share analysis for each industry within a province can be aggregated to yield the industry mix effect and the regional or competitive effect for the province. These two components identify how much of a province's rate of growth relative to the nation's rate of growth was due to differences in the provincial and national mix of industries and how much of it was due to favourable conditions on average for the industries within the province. Thus, shift-share analysis can be used as an aid evaluating macro influences on the provincial economy.

The geographic scope of the market for the products of each industry gives some indication both of the reasons for the abnormal growth pattern of an industry and of the types of governmental structural rationalizing measures required if performance is to be improved. For instance, if the market for a particular industry is essentially regional in the sense that there are virtually no exports or imports, and if the regional or competitive effects component in shift-share analysis for a particular province is weak, then it would appear that the demand for the products in that province grew more slowly than it did elsewhere in Canada. Obviously then, the direction for further research would be to discover why regional demand for the products of the industry in question is relatively weak. If on the other hand, the market is not essentially regional, but the regional effects component for a province is weak, then the research should be directed towards discovering why the province is not maintaining its share of the industry's activity at the national level; in other words, why it is not competing well. Finally, attention should be given to the changes in geographic concentration of industry within the province of Manitoba. The analysis should contain two complementary approaches. First, changes in the relative concentration of all industry by region should be known, and second, changes in the geographic structure of individual industries should be known.

VI Purpose and Scope of the Research

To summarize the previous section, the emphasis of this report is on the second stage of the suggested planning process - the evolution of the economy. The second stage should in turn be divided into two components. The first component would involve the employment of a number of measures to scan the economy and to constantly monitor its pattern of structural change. The second component would involve intensive industry level analysis of industries with abnormal patterns of structural change.

Five different types of measures were suggested for the scanning or monitoring component, namely, relative growth rates, relative sizes, shift share analysis, scope of the product markets and regional distribution of industry within the province. In other words, the emphasis is on the heartland-hinterland dual with respect to plant location. The intensive industry level stage of analysis should investigate such things as the number and relative size of firms, nature of ownership, residence of ownership, head office locations, traditional buyer-seller relationships, nature of the product, the product mix of the companies, differences in technologies, differences in productivity, material, transportation and labour costs. The result of an industry level study should not only indicate the potential for growth but the desirability of growth in relation to the public interest.

The research papers of this report deal only with the first component - the scanning process. In fact, only the first three types of measures were used extensively. The fourth type - the geographic scope of the product markets - needs development and the fifth type - the regional distribution of industry within the province - was not dealt with at all. (Information on this aspect of industrial organization may be more suitably left to the intensive industry level studies in any event) Finally with the exception of the first paper, the research was confined to the manufacturing division. Limitations in time and staff, and lack of accessible data in a useable form, are the reasons for the limited scope of research.

The unit of measurement used most often in the research for this report was employment, primarily because the available employment data are more complete and recent than other data bases. However, even the employment data are far from complete in some divisions, groups or industries, especially at the provincial level,and the reliability of what does exist, is questionable. Compared to other units of measurement, such as sales or revenue and value added there are both advantages and disadvantages in using employment. Therefore, additional insight no doubt would be gained if the research could be repeated using other units of measurement. (We did in fact do a shift-share analysis of the manufacturing division in terms of value - added, the results of which are not reported) Although the exact time periods for analysis differed somewhat within the research papers, the period from 1952 until 1973 or 1974 was the main focus throughout all the papers.

Despite the limitations in the scope for the research some useful information surfaced. In addition, the research does indicate some areas where further research would be fruitful. Also, if the method is to be used by others, the research illustrates two points. First, it indicates the necessity of constantly updating the work, and second, it indicates that the reliability of the techniques used could be improved if more reliable and alternative data were available and if some of the measures were improved. For instance, growth measured as the change in size between two periods of time is not the most rigorous or intellectually appealing measure.

B) Summary of the Research Papers

1 Paper One: Structure of Industry in Canada - Division Level:

Although the primary focus for analysis in this study was the manufacturing division, it was believed necessary to survey all economic activity first in order to put the manufacturing division into some perspective. The objective of Paper One was to provide that perspective. Trends in the rationalization process were analyzed by comparing relative growth rates and shifts in relative sizes of industries and provinces as measured by employment, at the divisional level. The time period was from 1951 to 1974 and the statistics used for the most part are estimates of the labour force as provided by the Labour Force Survey of Statistics Canada.

The research in this paper led to the following findings:

1. Although there were differences during this period in the economic structure of the provinces, as measured by the distribution of employment by division, the differences were not that great and there was a tendency for the

differences to diminish over time (see Paper No. One pp. 70-71).

2. The trend towards similarity in structure was spear-headed by the rapid growth in all provinces of the Service Division which accounted for close to 40% of the total labour force in each province in 1974 (see Paper No. One, p. 70).

3. When the two other service producing divisions (the Wholesale and Retail Trade Division and the Transportation, Communication and Utilities Division) were added to the Service Division,the service producing divisions' share of the national labour force (as opposed to the goods producing divisions' was 64% in 1974, and their share of real domestic product was 68% in 1971. However, unlike the Service Sector, the other two service divisions were only growing nationally at a rate comparable and to the overall rate of growth for the nation during the 1966 to 1974 period and as a result were not increasing in relative size (see Paper No. One, p. 83).

4. Contrary perhaps to conventional wisdom, the Public Administration Sub-division of the Service Division, although growing quickly, was not growing more quickly than the other two sub-divisions in that Division (the Finance, Insurance and Real Estate Sub-division and the Commercial, Business and Personal Services Sub-division) (see Paper No. One, Table 1, p. 80).

5. There was some evidence to support four common arguments for the rapid growth in employment in the Service Division. First, it has been argued that the growth in productivity of this Division is slower than elsewhere in the economy. This might be at least partly due to the fact that this division is less susceptible to technological change resulting from the introduction of labour-saving capital than the other divisions are. Thus, even in a balanced growth economy, as measured by output, one would expect a disproportionate rise in the relative size of the labour force in the Service Division. A second argument is that as per capita incomes rise, there is a tendency for expenditures on services to become a larger part of the consumer's budget. Third, it has been argued that management diseconomies to scale exist; that is to say, as the economy grows in size the bureaucracy required to administer it increases more than proportionately. The fourth common argument is that a growing economy allows the degree of specialization to increase and as a result, there is a tendency for goods producing firms to 'contract-out' for services which they previously did 'in-house'. Thus, there is a tendency for the measurement of the increase in the volume of business services over time to be biased upward.

6. The Manufacturing Division, which is the second largest employer in Canada and the third largest employer in Manitoba, was growing relatively slowly in Canada and in all provinces from 1966 to 1974. As a result its relative size was declining (see Paper One, Table 1, p.80 and Table 7, p.89. Also, manufacturing employment in Manitoba was growing more slowly than it was for Canada as a whole from 1966 to 1974 (9.1% and 16.1% respectively). However, its relative importance in Manitoba was not declining as quickly as it was for Canada as a whole. This apparent paradox is due to the fact that the Manitoban economy relative to the Canadian economy was growing even more slowly (see Paper One, pp. 80, 89).

7. The primary goods producing divisions collectively were also falling behind in relative size in both Canada and Manitoba during the 1966 to 1974 period in terms of employment. Agriculture actually declined in an absolute numbers as well as relatively. In Manitoba its decline was faster than it was for the country as a whole (-19.2% and -12.9% respectively). Agriculture in terms of real domestic product also declined in relative importance in Canada. This is a continuance of a historic trend; in 1941 Agriculture accounted for 11.9% of real domestic product in Canada but by 1971 its share had fallen to 4.3% (see Paper One, Table 2, p.81). Mining appears to be the one primary sector of the economy that has grown in relative size, at least from about 1960 onward.

8. To say that the provinces were becoming more similar in appearance, (structure) over time does not mean that they were becoming more similar in size. In fact, there were significant differences in the relative sizes of the provinces and these differences remained relatively stable from 1951 to 1974. For instance, Ontario and Quebec together accounted for 64.8% of the labour force in 1951 and 64.0% in 1971. Nevertheless, there have been some shifts. Generally, these shifts have been towards increasing the relative size of Ontario, Alberta and British Columbia and decreasing the relative size of all the rest. There are, in other words, two growth centres, namely Ontario and the two western provinces (see Paper One, p. 71).

9. During the 1966 to 1974 period Manitoba's employment grew by 12.6% which was considerably less than the national average of 22.4% and less than all the other provinces except Nova Scotia (11.1%) and Saskatchewan (5.8%). Shift-share analysis reveals that if Manitoba had grown at the national average from 1966 to 1974 it would have increased its labour force by 33,000 over its

actual increase. The province's failure to grow at the national rate was due primarily to the regional effect component (29,000 jobs or 88% of the 33,000). In fact, during this period each division grew more slowly in Manitoba than it did nationally. Thus, the failure of the province to grow at the national average rate was not due, apparently, to only one or two divisions pulling its aggregate growth rate down. As a general observation, if a province was growing relatively well during this period, it was growing relatively well in all divisions Conversely, if growth was slow in the province as a whole, it was slow within each division as well (see Paper One, p. 71).

II Paper Two: Trends in Industrial Location

Earlier in this summary report a theory was presented which argued that Canada was essentially a dual economy or rather a series of over-lapping duals from an organizational point of view, and that the lines of demarcation between each of the halves were becoming more distinct (see pp.10-11). For instance it would be argued that Ontario and Quebec and more particularily the southern part of these two provinces (referred to as the "Axis" by M. Yeates, Main Street, Toronto: MacMillan Company of Canada Limited, 1975.) is the 'heartland' of Canada's manufacturing division where the 'key' industries and 'centre' or core firms are concentrated. Also the key industries and centre firms are becoming more concentrated in the heartland over time. In contrast, the rest of Canada including Manitoba is the hinterland where the non-key industries and peripheral firms tend to locate. In Research Paper No. Two the geographic concentration of the manufacturing industries were measured to see if in fact the key industries were more concentrated than the non-key industries in the heartland than elsewhere and if in fact this differential in concentration was increasing over time. (Key and non-key industries are discussed and defined in Paper No. Two, pp.110-113). The empirical tests showed no statistically significant difference in the level, incidence, or rate of change in the geographic concentration of employment between the key and non-key industries for the period 1961 to 1971.

Using measures of geographic concentration free of incidence bias no statistically significant difference in the level of geographic concentration between the group of key industries and the group of non-key industries was found. (Incidence biased is explained thus: two industries with the same level of concentration do not necessarily have the same geographic incidence. For instance one industry could be concentrated in Ontario; another could be equally concentrated in Alberta.) Also, although the level of geographic concentration in employment was declining somewhat during the 1961 to 1971 period for the group of key industries it was not significantly different from the rate of decline in the group of non-key industries (see Paper No. Two, Findings Nos. 19 and 20, P.105). Similarily, when the incidence of geographic concentration in Ontario and Quebec was measured (A proxy measure for the Axis since approximately 94% of all the manufacturing labour force in Ontario and Quebec in 1971 was concentrated in the Axis area. See M. Yeates, Main Street), it was found that while the level of manufacturing concentration was high in this area, accounting in 1971 for 80% of all manufacturing employment compared to 64% of Canada's population, there was no statistically significant difference in the level of concentration between the key and the non-key groups. Also, although there was a modest decline in the level of concentration in Ontario and Quebec for both key and non-key groups of industries, there was no statistically significant difference in the rates of decline.

Thus, while Canada does have a heartland and hinterland, as indicated by the levels of concentration, the heartland, and by inference the hinterland, is equally concentrated in both the key and non-key industries and this level of concentration is fairly stable over time. These findings have important implications for policy. First, they imply that Manitoba, as part of the hinterland, cannot develop its manufacturing sector solely by promoting growth in non-key industries. Manitoba must promote the growth of key industries within its borders and the peripheral industries should develop as natural spin-offs. Such an implication is not startling. However, as a principle in policy formation, it can be easily violated. Key industries tend to have large plants in terms of employment and capital; they tend to be mature in organization in the sense that they have a few large firms which dominate the market and they tend to have stable and highly organized systems of marketing. Hence, for all these reasons, the key industries tend to have high entrance barriers. Therefore, it is all too easy for a provincial government to shy away from promoting the establishment and growth of these industries within its borders in preference to the non-key industries with lower entrance barriers.

Second, the findings imply that the relative size of Ontario and Quebec in aggregate has stablized. Ontario shows a slight tendency towards growth in relative size and Quebec shows a slight tendency towards decline in relative size (see Paper No. Three p. 166-167). Thus, while Manitoba does not have to worry too much about a massive drift of manufacturing activity towards the Axis, if it wishes to increase its relative size at the expense of Central Canada it must take positive steps to alter the existing forces. In other words, Manitoba's task is to alter, not simply strengthen, basic economic forces. This implication is supported by the research in Paper No. One which indicated that Manitoba government policy should be macro-oriented (see Paper No. One p. 75). Also, it should be recalled from Paper No. One, that manufacturing is not a fast growth division (see Paper No. One p . 70).

Considerable more research work needs to be done to more accurately identify the key industries and their relationships to other industries. For instance, since the level and incidence of geographic concentration is similar for most industries - highly concentrated in Ontario and Quebec, it is possible that the duality we are looking for is intra-industry rather than inter-industry. That is to say Ontario and Quebec may have the key plants and firms within each industry and the rest of Canada in each industry have satellite plants only. Secondly, if key and non-key industry groups were each further sub-divided into primary and secondary industries, a bias in concentration may emerge. Third, more sophisticated methods of identifying and measuring key industries may produce different results (see Paper No. Two , pp. 113-131).

The actual process of identifying key industries revealed some interesting insights. First, key industries based upon the degree of interdependence of intermediate goods shipments* were small in number but large in terms of their aggregate share of the intermediate goods supply (see Paper No. Two, Findings 3 to 8, pp. 102-103) Second, key industries based upon the relative amount of research and development expenditures were also small in number but large in their aggregate share of total research and development expenditures. For instance electrical products manufacturers (8 three-digit S.I.C. Industries; see note on p. 14), the Aircraft and Parts Industry (1 three-digit S.I.C. Industry) and other chemical products industries (8 three-digit S.I.C. Industries) accounted for 54%, 58%, 54% of all current intramural research and development expenditures in 1963,

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* Intermediate goods are defined as goods-in-process or materials; that is, goods that are shipped to other producers to be used in their production processes rather than being shipped to final consumers are intermediate goods. Key industries were defined as those industries which either shipped a high proportion of the total supply of the intermediate goods or purchased a large proportion of the total supply (forward and backward linkages respectively) or accounted for both a large proportion of the shipments and purchases.

1965 and 1967 respectively. (There is a total of 139 three-digit S.I.C. Industries; see Paper No. Two, Findings Nos. 9 to 11, pp.103-104). Third, key industries based upon growth rates were again small in number. Of the 139 three-digit S.I.C. industries, i) 54 grew in percentage terms faster than the national average manufacturing employment growth rate between the years 1961 to 1969, ii) 62 grew in percentage terms faster than national average manufacturing value added growth rate between the years 1961 to 1969, iii) 46 increased the absolute size of their employment by more than the mean average absolute increase in employment for the manufacturing industries during the period 1961 to 1969 and, iv) 41 increased the absolute size of their value added by more than the mean average absolute increase in value added for the manufacturing industries during the 1961 to 1969 period. (See Paper No. Two, Findings Nos. 12 to 15, p. 104). The actual number of key industries by any of the definitions may be slightly above or below the number indicated due to measurement problems.)

Finally, this paper tested the hypothesis that key industries, because they grew more quickly than non-key industries, were more geographically mobile. It was found that while key industries, based upon the interdependence criterion, tended to be faster growing in terms of employment, the faster growing industries showed no more inclination to re-locate geographically than slow-growth industries. If the test results are a good reflection of reality and if one accepts the argument that growth facilitates re-location, then one can only conclude that the incentives to move for the key industries were no stronger than they were for the non-key industries. (See Paper No. Two, Findings Nos. 21 and 22, p. 105). Although growth facilitates mobility, our measure of mobility could be sensitive to contraction as well. See Paper Two, p.140).

The major policy implications of the research in this paper are as follows:

1) The government should investigate the fruitfulness of improving macro-oriented policies with the objective of improving the overall competitive environment of the province if it wishes to strengthen its manufacturing sector.

2) Rather than promote new manufacturing activity on a company by company basis, the government should identify one or two key industries with good potential in Manitoba. It should then promote those industries and all industries associated with each of them. The key industries and the industries dependent upon them should be treated as a 'cluster' and the entire 'cluster' should be promoted.

3) Any successful development will probably involve policies which will change the direction of basic economic forces not merely moderating their rate of flow.

III Paper Three: Structure of Manufacturing in Manitoba

Although the meaning of growth and development must never be considered synonymous it is nevertheless true that development policy must take into account what sectors of the economy are growing quickly or show good potential for fast growth given the existing circumstances. Judgement of the growth potential of an industry in Manitoba ideally requires intensive analysis of that industry. However, owing to the large number of industries and constant monitoring required in times of change, it is not economical to study each industry intensively and continuously. As a second best alternative, some criteria must be used for the selection of industries to study intensively at one point of time. It is the purpose of this paper to describe one possible set of criteria and to use these criteria to isolate a few industries in Manitoba whose recent performance suggests that intensive industry level analysis would be fruitful. It must be stressed that insofar as we are concerned about government structural rationalization measures, the criteria used must isolate industries which are not growing (or contracting) at a desired rate rather than just isolating fast and slow growing industries.

An initial step towards the discovery of the growth potential of manufacturing industries involves examination of their growth performance over the recent past. Second, the relative importance of each industry within the province should be evaluated. A very small industry which is growing very quickly (or contracting very quickly) would not have the same short term repercussions on provincial performance as would a large industry. However, from a long term point of view small industries cannot be ignored. In addition, for comparative purposes, information on the relative size of each industry within Canada as a whole and the relative size in Manitoba of each industry was gathered.

Third, information on the origins of growth is required; that is, was growth of an industry in Manitoba due to the fact that the industry was a growth industry in Canada or was it a result of factors solely within the province? Shift-Share Analysis will be used as a guide for a preliminary judgement. Fourth, in an attempt to further isolate the causes of growth, information as to the nature of the product market (i.e. regional, national or international) will be examined.

A review of the industries of only two of the possible 20 groups of manufacturing industries has been done in Paper No. Three. The information to carry out a similar review is available from EDAB (The results of the shift-share analysis at the three-digit industry level is presented in Tabular form in the Appendix of Paper No. 3) However, the size of the research paper would have been too great if all groups were reviewed. The purpose of the review is to illustrate the method of analysis and how it can be used to indicate the direction of further research.

Before the two groups of industries (Metal Fabricating Industries and Transportation Equipment Industries) were reviewed in Paper No. Three, the manufacturing sectors of each of the provinces were compared. This summary will follow the same format.

The provinces were compared in three time periods, 1952 to 1959, 1961 to 1969, and 1969 to 1973. Although there were some shifts in provincial shares of total national manufacturing employment during the period 1952 to 1973, they were not dramatic. Perhaps a period of little more than twenty years is too short to detect underlying long term trends. Nevertheless, some other observations (besides the relative stability of provincial shares) can be made.

First Ontario, Alberta and British Columbia are slowly increasing in relative size while the other provinces are decreasing. There are, it would appear, two growth centres, Ontario and the Far West. Manufacturing activity is obviously flowing westward from the Maritimes and Quebec and most probably flowing to Ontario. However, the direction manufacturing is flowing from Manitoba and Saskatchewan and the reasons are not really known. The method of measurement of these trends is crude and the trends are neither strong nor regular. Therefore, before an investigation into the causes of these trends is initiated a more careful study is required to determine if these trends do indeed exist (see Paper No. Three, Findings Nos. 1 and 14, pp.166 & 169 - 170).

Second, although Central Canada's share of manufacturing over time has been virtually stable, it has been because Ontario's relative growth has been countered by Quebec's relative decline. These trends were most noticeable after 1961; Ontario's share rose from 47.2% in 1961 to 49.2% in 1965 and stabilized thereafter; Quebec's share declined from 33.5% in 1961 to 30.5% in 1973.

Third, while the distribution of industry in these two provinces resembled the national distribution (given their relative sizes one would expect little else) they were not identical to it. The differences generally favoured Ontario and hurt Quebec. During the 1961 to 1969 period, Ontario's favourable growth rate compared to the national average was accounted for primarily by the industry mix component in shift-share analysis (72% of net relative change), while Quebec's negative net relative growth was due primarily to the regional or competitive component (-62%). The conclusions to be drawn from this are that while Ontario's strong growth was partly due to its competitiveness within its industries (on average), growth was mostly due to its particular industry mix, and that Quebec's situation was just the opposite; it did have a poor industry mix but its poor performance was due mostly to its inability to maintain its share of the national market of the industries it had.

However, the relative growth rates of the industries at the national level from 1969 to 1973 changed and the impact of these changes was felt in Canada's heartland. Ontario's relative growth rate dipped down to the national average (marginally below it in fact) and Quebec's remained below the national average as well. The slow-down in relative terms for Ontario was due to a negative industry mix component; the regional effects component remained positive but not as large as the industry mix component. In Quebec, the negative influence of the industry mix component became even less of a factor; 90% of its poor performance was now explained by the regional effects component. In other words, the change in the relative growth rates of the industries nationally helped Quebec and hurt Ontario (see Paper No. Three, Findings, Nos. 4 to 7, pp.166-167). The other possibility, of course, is that the relative growth rates of the industries at the national level did not change but the mix of industries in each of the provinces did. This alternative explanation probably had some influence in reality but not as large as the one just suggested. This time period was just too small for there to have been radical changes in the structure of manufacturing in the provinces.

Fourth, British Columbia's and Alberta's experiences were similar to each other although there were some differences. British Columbia's share of manufacturing employment increased from 7.2% in 1952 to 8.3% in 1973. However, most of its above average national growth appears to have occurred between the years 1952 (or earlier) to 1955, and 1969 to 1973. During the 1960's its growth rate was below the national average and as a result there was downward pressure on its share of national employment. British Columbia's structure is one of the more highly specialized of all the provinces. During the 1960's it was competing well in these few industries (a positive regional effects component) but the few industries it had were heavily weighted towards slow growth (a negative industry mix component). Hence, it can be concluded that during the 1960's British Columbia was competing well (that is,increasing its share) in a few and generally slow growing industries. During the 1969 to 1973 period, when its relative growth rate was positive, both components of the shift-share analysis were positive. Hence, it can be concluded that due to changes in the relative growth rates of industries at the national level, British Columbia was competing well in a few but generally fast growing industries.

Alberta's share of national manufacturing employment also increased from 1952 to 1973 (2.5% to 3.2%) but its growth in relative size was more steady than British Columbia's. It also had a fairly highly specialized industrial structure which in the 1960's was weighted in favour of slow growth industries (a negative industry mix component). However, like British Columbia, Alberta competed well on average in these few industries (a positive competitive effects component). Finally, and again as in the case of British Columbia, the shift in the relative growth rates in industries at the national level from 1969 to 1973 was favourable to Alberta. The industry mix component was positive as was the competitive effects component. Therefore, both British Columbia and Alberta in the 1969 to 1973 period were competing well in relatively specialized structure consisting primarily of growth industries (see Paper No. Three, Findings Nos. 8 and 10, pp. 167-168).

Fourth, Saskatchewan was the slowest growing province in the 1960's; it was highly specialized in a few slow growth industries and was not competing well in them. Then in the period 1969 to 1973, its rate of growth surged upward to a level almost twice as high as the national average. Because of a lack of data as a result of confidentiality constraints, it is hard to know what the causes of this upsurge were. However, it was probably due to the same factors that were influencing Alberta and British Columbia (see Paper No.Three, Finding No. 11, pp. 168-169) It should be recalled from Paper No. Two that it was in the 1960's that growth in the mining sector accelerated. See (Paper No. Two, Table Two, p. 117).

Fifth, Manitoba's manufacturing sector which, next to Ontario and Quebec, was the most diversified, grew more slowly than the national average during the 1950's and 1960's and hence its share fell from 3.4% in 1952 to 3.0% by 1965. Although it had negative values for both the industry mix and the regional effects components, the industry mix component was the more powerful constraining force (80% compared to 20%) during the 1961 to 1969 period.

However, during the 1969 to 1973 period, Manitoba's growth rate was higher than the national average. The reason for this was a dramatic increase in the regional effects component; the industry mix component remained negative but was not nearly as strong. Therefore, it would appear that Manitoba's upsurge in growth from 1969 to 1973 was not primarily due to the same reasons that accounted for the upsurge in the other western provinces and the downturn in Ontario's growth, namely, the changing pattern of relative industry growth rates at the national level. Rather, for some reason Manitoba became more competitive on average within the existing industries (see Paper No. Three, Finding No. 12, p. 169).

Sixth, Manitoba's and Saskatchewan's better performance relative to the national average growth rate in 1969 to 1973 compared to 1962 to 1969 has to be placed in some perspective. The national average growth rate was approximately 2.6% per year from 1961 to 1969 (simple uncompounded average) compared to an annual rate of 0.9% from 1969 to 1973. Manitoba's improved performance in a relative sense was because its growth rate, which was below the national growth rate from 1961 to 1969, did not decline as much in the 1969 to 1973 period and as a result its relative growth changed from a negative to a positive value. In other words, Manitoba's growth rate was more stable in a cyclical sense than was Canada's. A comparison of the cyclical behaviour of Canada's and Manitoba's growth in employment from 1952 to 1973 also shows Manitoba to be less susceptible to large swings than Canada (see Paper No.Three Finding No. 16, pp. 170-171). Saskatchewan, on the other hand, actually increased its annual rate of growth from 1.4% in the 1960's to 1.9% in the early 1970's. British Columbia and Newfoundland like Saskatchewan, actually increased their annual rate of growth from 1.4% in the 1960's to 1.9% in the early 1970's, and thus appeared unaffected by the recession. Alberta, like Manitoba, saw its growth rate decline and yet remained relatively strong (its annual growth was approximately 3.4% and 2.1% from 1961 to 1969 and from 1969 to 1973 respectively). The rest of the provinces were all badly hurt by the recession (see Paper No. Three, Finding No. 15, p. 170).

Based upon size and growth in both Canada and Manitoba during the 1960's, the Metal Fabricating Industries and the Transportation Equipment Industries showed the most potential for further growth. Both of these groups were large and fast growing. The next two groups which showed the most growth potential were the Electrical Products Industries and the Machinery Industries. The former group was large and fast growing in Canada, and small and fast growing in Manitoba. The question why this group of industries is small in Manitoba needs to be answered. The latter group although small in both Canada and Manitoba, grew the fastest of all the groups in both jurisdictions. Textiles (primary) was small in both jurisdictions but while it was growing slowly at the national level it was growing quickly in Manitoba. The reasons for the differences in growth performance needs to be known. The Furniture and Fixture Industries and the Miscellaneous Manufacturing Industries were small in both Canada and in Manitoba. However, while both groups were growing quickly at the national level they were growing slowly in the province. Again, the differences in growth performance need to be explained. The largest group of industries in both Canada and Manitoba was the Food and Beverage Industries. In both jurisdictions this group was growing slowly, especially after 1965. In fact in Manitoba after 1965 it was actually contracting in size and in Canada it was contracting after 1969. This slow-growth group is relatively larger in Manitoba than in Canada considered as a whole. Primary Metal Products, Paper Products and Chemical Products were all large groups in Canada with average growth. However, they all were growing slowly or below average in Manitoba but the last two were small (see Paper No. Three, Findings Nos. 17 to 22, p. 171).

The remainder of Paper No. Three was an analysis of the performance of three-digit level industries in two groups of industries, namely the Metal Fabricating Group of Industries and the Transportation Equipment Group of Industries. Both of these groups considered as groups were large in Canada and in Manitoba; both were growing quickly in both jurisdictions but relatively more quickly in Manitoba. Hence Manitoba was competing well in two large fast

TABLE ONE: MANUFACTURING GROUP PERFORMANCE 1961 - 1969

SUMMARY OF TABLES FIVE AND SIX

	Group	Canada	Manitoba	Comments
1.	Metal Fabricating Ind.	Large and Fast Growth	Large and Fast Growth	
2.	Transportation Equip.	Large and Fast Growth	Large and Fast Growth	
3.	Electrical Prod. Ind.	Large and Fast Growth	Small and Fast Growth	
4.	Machinery Industries	Small and Fast Growth	Small and Fast Growth	Fastest Growing in Canada & Manitoba
5.	Textiles	Small and Slow Growth	Small and Fast Growth	
6.	Furniture & Fixtures	Small and Fast Growth	Small and Slow Growth	
7.	Misc. Manufacturing	Small and Fast Growth	Small and Slow Growth	
8.	Primary Metal Products	Large and Av. Growth	Large and Slow Growth	
9.	Paper Products	Large and Av. Growth	Small and Slow Growth	
10.	Chemical Products	Large and Av. Growth	Small and Slow Growth	
11.	Food and Bev. Prod.	Large and Slow Growth	Large and Slow Growth	Largest employer in Can. & Man. Manitob relatively large & relatively slower
12.	Clothing Industries	Large and Slow Growth	Large and Slow Growth	Man. relatively large & relatively faster
13.	Wood Products	Large and Slow Growth	Small and Slow Growth	Man. growing relatively faster
14.	Printing and Publish.	Large and Slow Growth	Large and Slow Growth	Man. growing relatively slower
15.	Leather Products	Small and Slow Growth	Small and Av. Growth	
16.	Non-Metallic Min. Prod.	Small and Slow Growth	Small and Slow Growth	
17.	Knitting Products	Small and Slow Growth	Unknown	
18.	Rubber Products	Small and Slow Growth	Non-existent	
19.	Petroleum and Coal Prod.	Small and Slow Growth	Unknown	
20.	Tobacco Products	Small and Slow Growth	Non-existent	

Source: EDAB Shift Share Analysis, Oct. 1975

A reproduction of Table Seven, Paper No. Three growing manufacturing groups. (In Shift-share analysis these are the only two groups which had a positive sign for the net relative change, and each of the industry mix and the competitive effects components for Manitoba in 1961 to 1969 period.) Clearly, the industries within these groups deserve closer analysis.

The Metal Fabricating Industries

There are certain characteristics that are common to all the industries within this group. First, almost all of their production could be classified as intermediate goods in the sense that their major customers are other producers. Second, a large customer, and in most of the nine industries the largest by far, is the Construction Division. Third, the preliminary evidence presented in Paper No. Three indicates that the majority of the markets for the products of these industries are regional as opposed to national or international. The general conclusions that can be drawn from the analysis is that based upon the criterion of potential improvement in the rate of job creation as a result of changes in government structural rationalization policy, there is little to be gained by researching this group of industries more closely. The group is already large and growing well but more importantly, it has a 'capitive' regional market. The fortunes of this group are closely tied to the growth performance of other producing sectors of the economy, particularily construction.

However, there is one and perhaps two other industries within the group that are exceptions. The Metal Stamping, Pressing and Coating Industry is the most notable. It is not nearly as dependent upon the construction sector as most of the other industries in this group are. In fact, it has a large number of customers (forward linkages) and it also has strong backward linkages. In Paper No. Two, this industry was identified as a key industry on the basis of the interdependence criterion (high forward and backward linkages or how much they sell and buy from other producers). Preliminary research indicates that the markets for the products of this industry are national, even international. A major product of this industry is metal containers, a product that virtually every industry has need of. However, the Fruit and Vegetable Canning Industry is obviously one of the bigger customers. The growth of the Metal Stamping, Pressing and Coating Industry at the national level was well above the average

TABLE TWO

THE METAL FABRICATING GROUP OF INDUSTRIES
Structural Characteristics of Apparent Demand and Supply

Industry	T.O.	-Ex	- ΔI	=TO_d	+ M	=TD_d	=I.D.	+ F.D.
Boiler and Plate Works	$79.5 (91.1%)	$-2.6 (3.0%)	$+1.1 (1.2%)	$78.0 (89.3%)	$+9.3 (10.7%)	$=87.3 (100.0%)	$=79.0 (90.5%)	$+8.3 (9.5%)
Fabricated St.Metal	223.4 (92.4%)	-4.7 -(1.9%)	-0.8 -(0.4%)	217.9 (90.1%)	+23.9 (9.9%)	=241.8 (100.0%)	=240.4 (99.4%)	+1.4 (0.6%)
Ornamental & Arch.Metal	111.3 (97.8%)	-0.5 -(0.4%)	-0.9 -(0.8%)	109.9 (96.6%)	+ 3.9 (3.4%)	=113.8 (100.0%)	=113.8 (100.0%)	+0.0 (0.0%)
Metal Stamp. Pressing and Coating	316.1 (85.4%)	-3.7 -(1.0%)	-4.3 (1.1%)	=308.1 (83.3%)	+61.9 (16.7%)	=370.0 (100.0%)	=330.9 (89.4%)	+39.1 (10.6%)
Wire and Wire Products	222.9 (80.8%)	-6.3 -(2.3%)	-1.1 -(0.4%)	=215.5 (78 1%)	+60.4 (21.9%)	=275.9 (100.0%)	=256.8 (93.1%)	+19.1 +(6.9%)
Hardware, Tools and Cutlery	114.9 (64.7%)	-10.6 -(6.0%)	-0.9 -(0.4%)	103.4 (58.3%)	+74.1 (41.7%)	=177.5 (100.0%)	=126.8 (71.4%)	+50.7 (28.6%)
Heating Equipment	92.2 (90.1%)	-2.0 -(1.9%)	+0.7 +(0.7%)	90.9 (88.9%)	+11.4 (11.1%)	=102.3 (100.0%)	= 95.3 (93.2%)	+ 7.0 +(6.8%)
Other Metal Fabricating	318.7 (79.2%)	-12.9 (3.2%)	-0.5 (0.2%)	305.3 (75.9%)	+96.6 (24.1%)	=402.3 (100.0%)	=360.4 (89.6%)	41.9 (10.4%)

Legend:
T.O. ≡ Total domestic output
E.x. ≡ Exports
ΔI. ≡ Change in inventory
T.O.$_d$ ≡ Total domestic output for the domestic market
M. ≡ Imports
T.D.$_d$ ≡ Total domestic demand
I.D. ≡ Intermediate demand
F.D. ≡ Final demand

Derived from Statistics Canada, The Input-Output Structure of the Canadian Economy, 1961, Volume II, Table 13.

Source: EDAB

A Reproduction of Table Sixteen, Paper No. 3

TABLE THREE: METAL FABRICATING INDUSTRIES: GROUP #13

MANITOBA EMPLOYMENT, 1961 - 1969

SIC NO	INDUSTRY	SIZE IN MANITOBA		SIZE IN NATIONAL INDUSTRY		GROWTH		SHIFT-SHARE				
		1961	1969	1961	1969	1961 to 1969	1961 to 1969	NRC	I.M.	C.E.	IM/NRC	CE/NRC
				%	%	%	△N					
301	Boiler & Plate Works	14*	17*	0.3	0.2	21.4	+ 3	0	+ 5	- 5		
302	Fabricated Structural Metal	765	1118	5.5	6.1	46.1	+353	+123	+15	+108		
303	Ornamental Arch.Met.	239	584	2.5	4.6	144.4	+345	+273	+11	+263		
304	Metal Stamp. Pressing and Coating	992	1139	5.3	3.7	14.8	+147	-150	+336	-486		
305	Wire & Wire Products	43*	102*	0.4	0.6	137.2	+ 59	+ 46	5	41		
306	Hardware, Tools & Cut.	43*	86	0.5	0.6	100.0	+ 43	+ 30	16	14		
307	Heating Equipment	246	401	5.0	7.9	63.0	+155	+ 81	-67	+149		
308	Machine Shops	416	532	5.1	3.7	21.9	+116	- 8	+201	-209		
309	Misc. Metal Fab.	507	881	3.5	4.2	73.8	+374	+222	66	155		

* Data estimated from Statistics Canada published data which, due to confidentiality requirements, was included more than the one industry.

Source: EDAB Shift-Share Analysis, October 1975

A Reproduction of Table Fifteen, Paper #3

TABLE FOUR: THE METAL FABRICATING GROUP OF INDUSTRIES

Distribution of Intermediate Demand

Industry	Intra-Group		Extra-Group				
	Intra Ind.	Total	Ranked in Descending Order				
			1st	2nd	3rd	4th	Other
	%	%	%	%	%	%	%
Boiler & Plate Works	3.4	7.2	Const. 79.9	A.O.Mach. 4.6	Other Metal 3.0	2.3	3.0
Fab. Structural Metal	2.2	8.9	Const. 79.9	A.O.Mach. 5.4	Aircraft 1.0	El.Appl. 0.7	4.1
Orn. and Arch. Metal	0.3	0.5	Const. 98.5	Mtr. Veh. 0.5	Other Trans Equip. 0.3	A.O. Mach. Equip. 0.2	-
Metal Stamping, Pressing and Coating	8.7	12.9	Const. 25.2	Fr.& Veg. Canning 14.4	Misc. Mfr. 4.4	Dairy Proc. 3.1	40.0
Wire & Wire Products	10.4	13.6	Op.& Supp. 26.2	Const. 21.6	Mtr. Veh. 6.5	Pulp & Paper 5.2	26.9
Hardware, Tools & Cutlery	2.2	5.2	Op. & Suppl. 42.5	Const. 32.7	Elec.Appl. 5.6	Furniture 4.5	9.5
Heating Equipment	0	6.3	Const. 89.9	El. Appl. 2.6	A.O.Mach.& Equip. 0.1	-	1.1
Other Metal Fab. Ind.	6.2	16.8	Const. 38.9	A.O.Mach. 14.4	Mtr.Veh. Parts 5.0	El.Appl. 4.8	20.1

Derived from Statistics Canada, The Input-Output Structure of the Canadian Economy, 1961, Volume II, Table 13.

Source: EDAB

A Reproduction of Table Seventeen, Paper #3 national rate for the manufacturing sector, and the industry is a large employer in Manitoba (1,139 employees in 1969). Yet despite all these favourable attributes the industry did not perform well in Manitoba during the 1960's. In fact, the rate of growth of this industry in Manitoba was not only below the national rate for this industry (a negative regional effects component) it was below the average manufacturing rate for Manitoba. As a result Manitoba's share of this industry's employment fell from 5.3% in 1961 to 3.7% in 1969. (Yet Manitoba accounts for approximately 3.0% of the national manufacturing sector; thus relatively speaking Manitoba is still large in the Metal Stamping, Pressing Coating Industry.) Finally, the high level of imports, the low level of exports and the high level of intra-industry shipments indicate a possibility of a trend towards geographic concentration facilitated perhaps by monopoly power. (See Paper No. Three, Finding No. 23 f, p 174, Paper No. Three Appendix Three, Tables One and Two confirm that there was indeed increased geographic concentration in this industry during the 1960's.)

Although the Wire and Wire Products Industry and the Hardware, Tool and Cutlery Industry were both small in Manitoba, using an analysis similar to the one used for the Metal Stamping, Pressing and Coating Industry, one must conclude that it would be useful to conduct a study of these two industries as well. Both were growing well nationally, had a high level of imports in 1961 and had a large number of customers besides construction. The Hardward, Tool and Cutlery Industry also had a fairly large percentage of its production shipped to final demand customers (see Paper No. Three, Finding No. 23 g, p. 175).

The Transportation Equipment Industries

In 1973 this group of industries accounted for 9.9% of all manufacturing employment in Canada and for 10.6% of Manitoba's manufacturing employment. At the national level only the Food and Beverage Group was larger (12.7%) and at the provincial level only the Food and Beverage Group (20.8%) and the Clothing Group (14.4%) were larger. During the 1960's and early 1970's its growth rate was also impressive. As a result of its size and rate of growth it was one of the more important sources of new jobs. From 1961 to 1969 its employment, in absolute terms, increased the most of all the groups in both Canada and Manitoba; from 1969 to 1973 the size its new job creation ranked second in both jurisdictions. However, it should be noted that the rapid growth of this group in the

1960's was preceded by a period of sharp contraction in the 1950's. Obviously like several other industries, this group of industries went through a period of reconstruction after World War Two.

Shift-Share analysis indicates that the decline in Manitoba in the 1950's was due primarily to general industry conditions: the industry mix component was larger than the competitive effects component. However, in the 1960's when this group began to grow quickly in Canada it was growing even more quickly in Manitoba (a positive competitive effects component).

Of the eight three-digit level industries classified in this group of industries only five were important employers in Manitoba, and the pattern of growth for these five were not uniform. These five are Aircraft and Parts (SIC No. 321), Motor Vehicle Manufacturers (SIC No. 323), Truck Body and Trailer Manufacturers (SIC No. 324), Motor Vehicle Parts and Accessories Manufacturers (SIC No. 325) and Railway Rolling Stock Manufacturers (SIC No. 326).

The Railway Rolling Stock Industry, which even in the early 1960's was the largest industry in this group, was declining in size quickly during the 1950's and 1960's. By 1969 it was no longer a major employer. If this industry was excluded from the group, the group in Manitoba during the 1950's actually had positive growth. In other words, the large and contracting Railway Rolling Stock Industry was the major explanation for negative growth of the group as a whole in Manitoba. This fact is not true for Canada considered as a whole. Although the Railway Rolling Stock Industry declined just as quickly at the national level as it did within Manitoba, this industry was not as large an employer relatively speaking in Canada as it was in Manitoba. Other industries in the group, contrary to the Manitoba experience, contracted (or grew slowly) relative to the national average manufacturing growth rate. Thus, there is some evidence to indicate that even during the 1950's as well as the 1960's and early 1970's Manitoba was competing relatively well in this group of industries.

Of all the industries in this group, the Truck Body and Trailer Industry should be subjected to further analysis. This Industry, a newly created three digit level industry in the 1960 revisions of the S.I.C. code grew nationally at a faster rate than the average for the manufacturing sector. However, its growth in Manitoba was even faster. Manitoba's share of this industry's national employment increased from 3.9% in 1961 to 15.0% in 1969. Actual employment between the same two years in Manitoba increased from 130 to 1,515; an increase of 1,385. In contrast if the industry in Manitoba had grown at the same rate that the industry grew nationally only 261 new jobs would have been created. Clearly Manitoba is competing well in a fast growth industry.

Products of this industry include such things as buses and bus chassis, trucks and truck chassis, cabin or house type trailers, other trailers and semi-trailers, military motor vehicles, motorcycles and special purpose motor vehicles. According to the import and export statistics contained in the 1961 Input-Output Table, the markets for these products are international rather than regional in nature.

Second in priority would be a study of the Motor Vehicles Industry and the Motor Vehicle Parts and Accessories Industry. The U.S. - Canada Auto Trade Agreement and the monopolistic nature of the Motor Vehicles Industry obviously had some impact on the geographic structure of these two industries. For instance, during the 1950's when the economy in general was growing slowly, both these industries had negative values for their industry mix and positive values for their competitive effects components in the shift-share analysis for Manitoba. However, during the 1960's when the economy's over-all rate of growth was strong, both these industries had a positive industry mix component and a negative competitive effects component in Manitoba. These results indicate that during the recessionary period of the 1950's when these two industries were growing at a rate below the national average for manufacturing, that is declining in relative size nationally, Manitoba was competing quite well in these industries. In fact, due to its competitive performance in the Motor Vehicle Parts and Accessories Industry, the province more than doubled its employment in that industry (116.7% growth rate). However, in the 1960's when the economy strengthened and the relative size of these two industries began to increase nationally, Manitoba's relative growth in these two industries was low as a result of the province's poor competitive performance, and therefore Manitoba's share of the industries' employment fell (see Paper No. Three, Findings 24 k, pp.174-175).

Finally the preliminary research in this study indicates poor potential in Manitoba for the Aircraft and Parts Industry. The product markets for this

TABLE FIVE: TRANSPORATION EQUIPMENT INDUSTRIES
GROUP # 15, MANITOBA EMPLOYMENT 1961-1969

A) 1961 - 1969

SIC NO	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CB
				%	%	%	△N			
321	Aircraft & parts	820*	1,822	2.9	5.3	122.2	1,002	756	7̄8	835
323	Motor Vehicle mfg.	547*	204*	2.5	0.5	6̄2.7	3̄43	5̄06	347	8̄53
324	Truck body & trailer	130	1,515	3.9	15.0	1,065.4	1,385	1,346	222	1,124
325	Mtr. veh. pts.&acces	265	425	1.3	1.0	60.4	160	80	184	1̄03
326	Rlwy.rolling stock	3,374	204*	20.4	3.3	9̄4.0	3̄,170	4̄,183	3̄,136	1̄,046
327	Shipbldg. & repair	-	-	-	-	-	-	-	-	-
328	Boatbldg. & repair	40	115	2.7	4.3	187.5	75	63	21	42
329	Misc. vehicle	-	c	-	c	n/a	n/a	n/a	n/a	n/a

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, October 1975

A Reproduction of Table Eighteen, Paper #3

B) 1952-1959

SIC NO	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share			$\frac{E_i}{E}$	
		1952	1959	1952	1959	1952-1959	1952-1959	NRC	IM	CE	1952	1959
						%	△N					
330	Aircraft & Parts	684*	1,003*	2.1	3.5	+46.6	319	315	-102	418	2.6	2.2
332	Bicycles & Parts	0	0	0	0	0	0	0	0	0	0.1	0.1
333	Boatbldg. & Repair	18	60	1.2	3.4	+233.6	42	42	3	39	0.1	0.1
334	Motor Vehicles	684*	668*	2.2	2.3	- 2.3	-16	-19	-61	42	2.4	2.2
335	Mtr. Veh.Pts.&Acc.	144	384	0.7	2.0	1̄66.7	240	239	-19	259	1.7	1.5
336	Rwy. & Roll. Stock	6,225	3,735	17.3	18.4	-40.0	2,490	2,526	2768	242	2.8	1.6
337	Shipbldg. & Repair	0	0	0	0	0	0	0	0	0	1.6	1.1
339	Miscellaneous	0	0	0	0	0	0	0	0	0	0.1	0.1

TABLE SIX: THE TRANSPORTATION EQUIPMENT GROUP OF INDUSTRIES
STRUCTURAL CHARACTERISTICS
OF APPARENT DEMAND AND SUPPLY - 1961

INDUSTRY	T.O.	- Ex	- △1	$=TO_d$	+ M	$=TD_d$	= I.D.	+ F.D.
Aircrafts and Parts	347.5 (83.4%)	-132.3 (-31.7%)	-10.5 (-2.5%)	204.9 (49.2%)	+211.9 (50.8%)	416.8 (100.0%)	87.7 (21.0%)	329.1 (79.0%)
Motor Vehicles (Passenger Cars)	698.5 (83.0%)	- 17.9 (-2.1%)	-14.7 (-1.7%)	665.9 (79.2%)	+175.2 (20.8%)	841.1 (100.0%)	0.0 (0.0%)	841.1 (100.0%)
Truck Body & Trailer Commercial Vehicles	158.0 (90.4%)	- 6.1 (-3.5%)	-3.6 (-2.1%)	148.3 (84.8%)	+26.5 (15.2%)	174.8 (100.0%)	0.6 (0.1%)	174.2 (99.9%)
Commercial Trailers	21.7 (74.3%)	- 0.8 (-2.7%)	0.0 (0.0%)	20.9 (71.6%)	+ 8.3 (28.4%)	29.2 (100.0%)	1.0 (3.4%)	28.2 (96.6%)
Vehicle Body and Trailer	33.6 (67.2%)	- 4.4 (8.8%)	-0.2 (0.4%)	29.0 (58.0%)	+21.0 (42.0%)	50.0 (100.0%)	2.1 (4.2%)	47.9 (95.8%)
Motor Vehicle Parts Accessories	339.0 (49.5%)	- 20.1 (2.9%)	-2.1 (0.3%)	316.8 (46.3%)	+367.9 (53.7%)	684.7 (100.0%)	603.1 (88.1%)	81.6 (11.9%)
Railway Rolling Stock	57.5 (92.6%)	- 7.5 (-12.1%)	+1.2 (1.9%)	51.2 (82.4%)	+ 10.9 (17.6%)	62.1 (100.0%)	35.3 (56.8%)	26.8 (43.2%)
Boatbuilding and Repair	84.8 (83.7%)	- 9.9 (-9.8%)	-0.0 -	74.9 (73.9%)	+ 26.4 (26.1%)	101.3 (100.0%)	10.6 (10.5%)	90.7 (89.5%)

Derived from The Input-Output Structure of the Canadian Economy 1961, Statistics Canada

Source: EDAB

A Reproduction of Table Nineteen, Paper #3

TABLE SEVEN: THE TRANSPORTATION GROUP OF INDUSTRIES
DISTRIBUTION OF INTERMEDIATE DEMAND

Industry	Intra-Group		Extra-Group				
	Intra-Ind.	Total	Ranked in Descending Order				
			1st	2nd	3rd	4th	Others
			%	%	%	%	%
Aircraft and Parts	85.2	85.2	Transp.& Stor. 13.3	Agric. 1.1	-	-	0.4
Motor Vehicles (Passenger Cars)	-	-	-	-	-	-	-
Truck Body and Trailer							
Commercial Vehicles	0.0	80.0	A.O. Mach. 20.0	-	-	-	-
Commercial Trailers	0.0	54.5	Other Metal 37.3	Met.Stmp 4.1	El.App. 4.1	-	-
Veh. Body and Trailer	0.0	52.4	Oper.Supp. 47.6	-	-	-	-
Motor Vehicle Parts and Accessories	10.1	78.0	Oper.Supp. 15.1	Trans. & Storage 4.7	-	-	2.2
Railway Rolling Stock	0.0	34.0	Trans.& Stor. 62.6	Mining 2.8	-	-	0.6
Boatbuilding & Repair	81.0	81.9	Trans.& Stor. 14.3	-	-	-	3.8

Derived from The Input-Output Structure of the Canadian Economy 1961, Statistics Canada

Source: EDAB

A Reproduction of Table Twenty, Paper #3 industry are international and the level of research and development expenditure is very high. In addition, while employment growth rate for this industry in Manitoba was high during the 1960's,the growth path was very cyclical and the growth rate for the nation as a whole was low.

A viable Aircraft and Parts Industry anywhere in Canada would need at minimum a large source of working capital to finance research and development expenditure and marketing costs quite apart from any fixed capital requirements.

IV Paper Four: Forecasting Relative Performance in Manufacturers by Province with Reference to Manitoba

This last paper was prepared by Dr. P. L. Wahi for EDAB. The purpose of the paper was two-fold. First, the literature on forecasting techniques of structural change was to be reviewed and summarized. Second, an actual forecast was to be made using one of the more promising yet pragmatic techniques. Dr. Wahi in the first part of his paper summarized five forecasting techniques. The first technique was an adaption of Shift-Share Analysis. This technique, it was concluded, is weak as a forecasting model for at least two reasons. Shift-Share Analysis is descriptive, rather than interpretive, and as such has no underlying theoretical justification. The second major criticism was that the value for the competitive effects component is obtained as a residual to the other parts of the identity and has been found to be sensitive to different levels of data disaggregation (see Paper No. Four, pp. 256-259).

The second technique, Intersectoral Flows Analysis, is a relatively new technique which is a static allocation model; it assumes that the ratio of inputs to outputs is constant. Although simpler in construction it is similar in principle to Input-Output Analysis. By allocating employment in an industry in proportion to the forward linkages of its shipments, estimates of the total labour content (direct and indirect) of all classes of final goods can be made. Then if some estimate can be obtained of projected increases in demand for all final goods, it is possible to estimate the impact of those increases on the employment in each industry. It is then a simple step to calculate changes in the relative share of employment by industry. This technique also is not behavioral and must operate under the assumption that there will be no major technological advances which will alter the labour output ratio of any of the industries. Although the data collection requirements are not as onerous as the Input-Output technique, they are still difficult. Also, the technique lacks a cross-check mechanism like Input-Output Analysis and as a result the probability of an 'over-sight' error in the data processing increases. Finally the reliability of the forecasting depends upon the accuracy of the estimates of the changes in demand of the final goods (see Paper No. Four, pp. 259-261).

A third technique is regression analysis, whereby the relative growth rate and thus a change in relative size of an industry (the dependent variable) is made a function of several factors (the independent variables) and the co-efficients of the independent variables are estimated by regression. If the co-efficients as estimated, are assumed stable, then estimates of future changes in the dependent variable can be made, once the relevant values of the independent variables are known. The problem with this technique, of course, is to identify a behavioral function with good explanatory power (see Paper No. Four, p. 256).

The fourth technique is a hybrid of the first three techniques. First an Intersectoral Flows Table is developed. Then estimates of expected changes in final demand are made using Shift-Share Analysis. The Shift-Share Analysis, however, is improved, theoretically at least, by defining the residual, the competitive effects component, as a behavioral function of several independent variables. The competitive effects component is then estimated by regression analysis rather than just being as an undefined residual. The complexity of this technique and the required data collection makes the technique costly. As a result, little forecasting using this technique has been done, and its predictability, the real acid test of any technique, is unknown. Theoretically, however, it has much appeal (see Paper No. Four, pp. 261-264).

The final technique and the one used for actual forecasting in this paper is Markov Chains Analysis. Simply put, this technique is a sophisticated method of projecting historical trends into the future. The technique allows for uncertainty by assigning probabilities to all likely changes. Each possible change, including the possibility of no change is called a state. Then an element, say an industry in a province, is assigned a probability of moving into any one of the states in the next time period. The probabilities are assigned according to past performance of elements that were in the same state as the element under consideration is now in. Once the probabilities for all possible changes are assigned for each industry in each province, and thus a transition probabilities matrix is constructed, it is possible to estimate what the overall structure will be one period hence if the present structure is known. This process can be repeated any number of times and the structural changes projected ahead for any number of years. However, it is a property of Markov Chains Analysis that the structure will evolve towards a stable state or equilibrium; that is to say, after a certain number of years, the evolved structure will not change if the experiment is repeated again (see Paper No. Four,

The forecasted structural change, it must be emphasized, is an estimate of the most probable result of evolution based upon the assigned probabilities; the assigned probabilities in turn are reliable only to the extent that historical changes will reflect future changes. It was for this reason that Dr. Wahi, in the beginning of Part II of his paper, listed some of the factors which he felt might qualify the reliability of the probabilities used and might explain any differences between the projections and what actually occurred (see Paper No. Four, pp. 264-266).

A different set of probabilities were generated from the experiences of the period 1961 to 1969, 1961 to 1965 and 1965 to 1969. Also the manufacturing sector was analyzed at the group level (two digit level) which contained 20 groups and at the three digit level which contained 188 industries. Finally, activity was measured by employment and value added. As a result 12 different projections were made: three time periods times two levels of aggregation times two units of measurement.

All twelve projections generally predicted the same direction of change in the relative shares of the provinces although the strength of the shifts were different. Second, all twelve projections arrived at a stable structure around 1975 (and no later than 1980). This finding is in accord with the findings in the previous papers that indicated that the shares of the provinces in manufacturing were relatively stable over time.

The analysis forecasted that Manitoba's historically declining share of manufacturing (since at least 1952) would continue to decline. According to group level analysis the share of manufacturing employment, for instance was 3.4%, 3.2%, 3.1%, 3.0%, and 2.9%, 1952, 1955, 1961, 1965 and 1969 respectively. The analysis forecasted that by approximately 1975, Manitoba's share would have fallen to 2.3% (based upon the 1961 to 1969 transitional matrix) to 2.3% (based upon the 1961 to 1965 transitional matrix) and to 1.6% (based upon the 1965 to 1969 transitional matrix). However, data for 1973, the latest year for which data were available (at the time of writing this report) indicates that Manitoba's share was 3.0%. Rather then declining as predicted, the share increased marginally. (Recall that in Paper No. Three, it was shown that Manitoba's growth rate for 1969 to 1973 was greater than the national rate.) The prediction was based upon the assumption that the prevailing underlying economic conditions of the 1960's could continue into the 1970's. If the prediction technique is reliable, then economic conditions must have changed in a favourable way for Manitoba beginning around 1969. Shift-Share Analysis in Paper No. Three revealed that Manitoba's improved growth performance relative to the Canadian average during the 1969 to 1973 period was due primarily to an increase in the competitive effects component (see above, pp. 28-29); this fact implies that there was an improvement in the overall competitiveness of Manitoba's manufacturing sector. (Recall that competitiveness in shift-share analysis refers only to increases in the market share of an industry. As a result, an improvement could be due solely to a fortuitous change in demand.) Employment in Canada grew by 16.1%, 6.7% and 4.5% during the periods of 1961 to 1965, 1965 to 1969, and 1969 to 1973 respectively. Employment in Manitoba grew by 10.8%, 6.6% and 6.6% during the same three periods. Thus, while Manitoba's performance improved over time relative to Canada's due to improved relative competitive conditions, the level of economic growth was decreasing. In other words, Manitoba was doing relatively well during a period of economic slow down.

Whatever were the causes of the change in general economic conditions of the early 1970's, the change produced some interesting contrasts between predictions and reality. Ontario, for instance, was expected to continue to increase its share. From 1952 to 1969 its share had slowly risen from 47.3% to 49.3%; according to the forecasting analysis, this rate of increase was to accelerate in the 1970's and by 1975 Ontario's share was to have stabilized at 55.1%. In fact, by 1973, Ontario's share was the same as it was in 1969. Or more accurately, it had declined marginally from 49.3% to 49.2%. Shift-Share Analysis in Paper No. Three showed that Ontario's relative decline in growth was due primarily to the industry mix component (see above, p. 26).

On the other hand, Quebec's predicted continued decline was arrested somewhat. This province's share, which had fallen from 33.4% in 1952 to 31.6% in 1969, was supposed to have fallen to 23.7% by 1975. In fact, by 1973 it had fallen to only 30.5%. Quebec's better than expected performance was still below average, but the changes in the economic conditions apparently weaken the negative value of the industry mix component; Quebec's below average performance in the 1969 to 1973 period was almost entirely due to a negative valued competitive effects component (see above, p. 26). Alberta improved its share of manufacturing employment by 1973 but not at the rate expected by the forecast. This province's share was to have increased from 3.1% in 1969 to 3.7% in 1975 but by 1973 its share was only 3.2%. Paper No. Three showed that Alberta's rate of growth was adversely influenced by the general down-turn of the economy.

Saskatchewan did better in actuality than was predicted. However, this province's share historically has fluctuated around 1.0% and there is nothing in the analysis to suggest this pattern has changed.

Perhaps, the most interesting case is British Columbia. The analysis forecasted a decline for this province from 7.5% in 1969 to 7.3% in 1975. However, by 1973, her share had in fact risen to 8.3%. Obviously changes in economic conditions affected its fairly specialized manufacturing sector favourably.

While a comparison of predicted changes and actual changes is interesting, it would appear that such comparisons contribute little over and above what has been gleaned from other types of analysis. The relative stability in the shares means that any projection based upon the Markov Chains Technique will only be for a few years into the future; thus equilibrium is quickly reached. Also, the predictions which are based upon current conditions will indicate what will be if basic conditions do not change. Conditions obviously changed in the 1969 to 1973 period. Markov Chains Analysis unlike Shift-Share Analysis gave us no clue as to the possible reasons for the changes. Thus, in view of the complexity of the technique and the expense of using it, the continued use of this technique is not advisable. The method in Paper No. Three, that used Shift-Share Analysis and other indicators of performance as a preliminary scanning or screening process and then selected particular areas for more intensive research, would be a more fruitful approach.

C) Conclusions

The Manitoban economy since at least 1952 has been declining in relative importance in the Canadian economy in terms of employment and real domestic product. In other words, Manitoba during this period grew at a slower rate than the nation. Analysis of the relative sizes of all the provinces reveals that there appears to be a gradual shift of economic activity towards Ontario, (especially southern Ontario) and the two western provinces of Alberta and British Columbia and away from all the other provinces. These shifts have not been large during the 1952 to 1974 period, but the trends have been persistent; the implication is, of course, that the shifts are due to fundamental long term forces.

The relatively poor employment growth performance in Manitoba, between 1966 and 1974 was due to the fact that the growth of each division within the province was below the national average for growth for the respective division. As a result the regional effect component of shift-share analysis accounted for 88% of the negative net relative change. If Manitoba had grown at the national rate of growth, 33,000 additional jobs would have been created between the years 1966 to 1974; of these 33,000 jobs, 29,000 would have been due to the regional effect.

The implication is clear; if the objective is to increase the relative rate of growth for Manitoba, policy measures must be introduced that will improve the over-all attractiveness or competitiveness of Manitoba as a region. Some basic changes in macro policy areas such as transportation, manpower, taxation, tariffs, government purchases, and investment are necessary. Macro is used here to mean policies that influence the performance of all sectors within a region rather than a specific industry.

Such a development strategy has to be primarily the responsibility of the federal government. This does not mean that the provincial government can do nothing effective; it does mean, however, that the effectiveness of any provincial policy would be much greater if the federal government had a complementary development policy.

Finally, it does not follow that the sole underlying approach to any development strategy need be 'balanced growth' of all sectors. In fact, there may be leading sectors whose growth would have spread effects into the other sectors. There is room for micro or specific policy measures also. For instance, research in Paper Three suggests that there are clusters of industries within the manufacturing sector and that within each cluster there tends to be one or two key industries.

Despite the changes in relative sizes, the provinces structurally are similar and appear to be becoming more similar over time. One of the reasons for the growing similarity in structure is the large size and rapid growth of the service division in each province. Given the large size and the rapid growth rate of this division, it would be of value to know more about the causes of its growth and the potential for further development in Manitoba. For instance, it would be useful to know what services would attract further growth for Manitoba in other divisions and what services grow in Manitoba as a result of growth in other divisions.

The most obvious differences in the structure of the Canadian and Manitoban economies are the relative sizes of the manufacturing and agricultural divisions. Manufacturing, which is the second largest division by employment in Canada and the third largest in Manitoba, is naturally a relatively, larger division in Canada than in Manitoba. In 1966 this division accounted for 24.4% of national employment and 15.9% of provincial employment; in 1974 the shares were 22.2% and 14.6% for the nation and the province respectively. Agriculture, on the other hand, is relatively smaller in Canada than it is in Manitoba. In 1966 agriculture accounted for 7.6% of national employment and 15.0% of provincial employment; in 1974 the shares were 5.2% and 10.2% for the nation and the province respectively. Notice that from 1966 to 1974 the differences in the relative sizes of each of these divisions in Canada and in Manitoba narrowed. These trends are consistent with the assertion that the provincial economies are becoming more similar in structure over time.

The manufacturing division in Manitoba has a fairly broad range of industries and tends to be relatively immune from business cycles. Currently in Manitoba, it is performing quite well relative to the national rate of growth for manufacturing. However, from a longer point of view the situation does not look so healthy. First, its share of provincial employment in Manitoba is smaller than its share of national employment. Second, manufacturing employment nationally has been growing more slowly than the economy as a whole has been growing. Therefore, in relative terms it is a declining sector of the national economy. This declining trend in relative size is also evident when growth is measured in terms of real domestic product. Third, manufacturing in Manitoba is growing more slowly than it is on average elsewhere, and therefore Manitoba is becoming less important in Canada's manufacturing sector. Nevertheless, because the over-all Manitoban growth rate is relatively slower compared the over-all Canadian growth rate than is the Manitoban manufacturing division's rate of growth compared to the national rate of growth for manufacturing, manufacturing is becoming a relatively larger part of the Manitoban economy. In other words, although Manitoba is becoming less important within a division which is declining in relative size nationally, that division, manufacturing, is becoming relatively more important to Manitoba. It should be noted, as well, that because Manitoba's manufacturing sector historically has been less subject to cyclical swings than manufacturing at the national level, its performance relative to manufacturing for the nation as a whole improves during the recessionary phase of a cycle. In other words, growth of manufacturing in Manitoba does not improve compared to its past rates in recessionary times but it does not decline by as much as manufacturing does elsewhere. The early 1970's were recessionary years for the manufacturing sector in Canada. Growth in manufacturing employment for Canada declined from 16.1% during the period 1961 to 1965 to 6.7% during the 1965 to 1979 period to 4.5% during the 1969 to 1974 period. In Manitoba the growth rates for the three respective periods were 10.8%, 6.6% and 6.6%. Therefore, the comparative strength of manufacturing in Manitoba could be simply a cyclical aberration.

Agriculture, which traditionally has been one of the mainstays to Manitoba's economy, is declining even in absolute numbers of employment both nationally and provincially. The ramifications of this strong structural change have been and will continue to be significant to Manitoba's way of life. It is equally clear that agriculture will remain an important base to Manitoba's economy. Therefore, a logical emphasis for future economic development would be to build on this base; such an emphasis, of course, would only be a continuance of past rationalizing trends.

The promotion of the Food and Beverage Industries in the manufacturing division is one obvious choice of policy direction. However, the preliminary results of our research are not encouraging. Although the Food and Beverage Industries Group is the largest employer of all the twenty manufacturing groups in both Canada and Manitoba (in 1969 it accounted for 22.7% of all manufacturing employment in Manitoba compared to 13.4% in Canada), it has not been a strong growth group of industries after 1961. In fact, employment actually declined for this group during the 1969 to 1973 period by 1,599 jobs and 260 jobs in

Canada and Manitoba respectively. Shift-Share Analysis for this group in Manitoba revealed a negative value for the regional effects component for each of the three separate time periods of 1952 to 1959, 1961 to 1969, and 1969 to 1973. In other words, Manitoba appears to be competing poorly in a slow growth group of industries. Yet given the slow over-all growth in these industries nationally, if Manitoba is to have significant growth it must do so at the expense of other provinces.

Research Paper No. Two examined one aspect of the argument that not only is Canadian manufacturing concentrated in the southern parts of Ontario and Quebec but the structure of industry in that area is qualitatively different from elsewhere in Canada and this difference is increasing over time. Industries were classified as key or non-key depending upon the strength of their forward and backward linkages to other industries, or how much they sell and buy from other producers. The research found that there was no significant difference in the level of geographic concentration on average between the key and non-key industries. Also, although there was a slight tendency for the level of geographic concentration to decline during the period 1961 to 1969, there was no significant difference in the rate of decline between the key and non-key groups of industries. Similarily, when the incidence of geographic concentration was examined, it was found that while manufacturing is highly concentrated in Ontario and Quebec where there is approximately 80% of all manufacturing employment in contrast to approximately 64% of the total national population, there was no significant difference in the average level of concentration between the key and non-key industry groups. Finally, although there was a slight tendency for the incidence of geographic concentration in Ontario and Quebec to decline somewhat, there was no significant difference in the rate of decline between the key and non-key industry groups.

The research also found that while the key industries tended to be the growth industries, there was no correlation between growth and geographic mobility. Intuitively, one would expect geographic relocation to be easier for growth industries than for non-growth industries. The fact that there was no real difference in the rate of mobility between the growth and non-growth industries and the fact that in net there were no large inter-provincial shifts in provincial shares of national manufacturing activity indicates that quite apart from the ability to move, there was little incentive to move.

One conclusion of these findings is that if the distinction between key and non-key industries is a valid one, the non-key industries tend to locate geographically in a pattern similar to the pattern of location for the key industries. The implication of this conclusion for Manitoba is that if it wishes to promote the growth of the manufacturing division in Manitoba it cannot concentrate its promotional efforts on non-key industries alone. In fact, in the absence of proof to the contrary, the presumption that non-key industries location decisions are determined by the location decisions of key industries seems to be the most realistic one to make. Therefore, if there is to be any bias at all in Manitoban development strategy it should be towards encouraging the key industries, especially the ones that are growing quickly, to settle and expand in Manitoba.

The findings of this research also support the findings of the shift-share analysis in Paper No. One and Three. The negative values for the regional or competitive effects component indicate that the attractiveness of this province for expansion in manufacturing in general is comparatively low.

Shift-Share Analysis and trends in geographic concentration merely describe what has been happening; they do not explain why it has been happening. However, the descriptive analysis does indicate where further research should be focused to discover the reasons for what has been happening. Clearly the influence of macro policies on the structural rationalization process must be examined as should the possibility of encouraging the development of one or two key industries and the clusters of industries associated with them. One must not leap to the conclusion that the reason for this unattractiveness is the result of the policies of the present Government in Manitoba. The time period from 1969 to 1973 was the only time period of all the time periods analyzed where the competitive effect component was positive; the present Government came to power in 1969. The causes of slow growth in the Manitoban manufacturing are chronic. Whether or not the policies of the provincial government have strenthened or weakened these rationalizing trends is a matter of partisan speculation and rhetoric in the absence of hard research.

Not all manufacturing industries are performing badly in Manitoba. However, even in terms of relative growth rates it is difficult to judge what is good rationalizing performance and what is bad rationalizing performance. Intuitively, one would not be too concerned about the rationalizing process in a fast growth industry where Manitoba is increasing its share of the national market; that is to say, Manitoba is apparently competing well in a fast growth industry.* It is still possible that this industry is not growing at its potential rate in Manitoba but given that all industries cannot be studied intensively, such an industry could be ignored. Similarily, one should not be too concerned about the rationalizing activity of a slow growth industry where Manitoba is contracting relatively quickly (a' --- ' industry). At a preliminary level of analysis, the decline in the relative size of Manitoba in a slow growth industry is a sign of good rationalizing performance. Such a conclusion would have to be qualified somewhat if the industry is a large part of the Manitoban manufacturing sector and if despite the decline in size, the industry still has a hard core of demand for its products.

The industries which would show the most potential for further research would be those industries where Manitoba's growth rate runs counter to the national growth rate. These industries would include any industry that is growing quickly in the nation but Manitoba's share of that industry is declining, or any industry that is growing relatively slowly in the nation but Manitoba's share of that industry is increasing. The list of such industries would still be too large. Research Paper No. Three develops and uses several other criteria to narrow such a list.

The results of the Markov Chains analysis (a forecasting technique) in Paper No. Four when coupled with the results of the previous research papers yield some interesting insights. First, according to the forecast, if the basic economic conditions of the 1960's continued into the 1970's, Manitoba's share of manufacturing would continue to decline. However, by 1973, the latest year for which the data were available, Manitoba's share not only had not continued to decline, it had in fact shown a modest upward tendency. Shift-share analysis for Manitoba from 1969 to 1973 showed that this reversal in trend was due primarily to the regional or competitive effects component. One explanation for the reversal could be the economic cycle argument. Manitoba traditionally does relatively better than Canada in recessionary times. Nevertheless, it is also possible that some fundamental or long term changes in the economic forces occurred.

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* Such an industry in shift-share analysis would have plus (+) values for the net relative change and each of the two components; thus it could be identified as a '+ + +' industry. The other possible results of shift-share analysis could be '+ + -', '+ - +, '- + -', '- - +, and ' - - -'. In the Appendix to Paper No. Two, there is a table which classifies each three digit level manufacturing industry into one of the six possible results.

The other western provinces also did fairly well during the early 1970's but for apparently different reasons. British Columbia and Saskatchewan actually accelerated their growth rate and thus increased their share of national manufacturing over what the Markov Chains analysis forecasted. Alberta, although it grew well compared to the national average, did suffer a decline in its growth rate and as a result did not increase its relative share of national manufacturing to the extent predicted by the forecasting technique. Because of limited data available for Saskatchewan it is difficult to even hazard a guess as to what is the source of its improved growth performance. In any event Saskatchewan accounts for only one percent approximately of total Canadian manufacturing activity. It should be noted however, that the mining sector in Canada grew quite strongly during this period and both Alberta's and Saskatchewan's share of this division's national employment grew. Given the fact that both these provinces have a fairly specialized manufacturing sector it is quite possible that their manufacturing sector grew as a result of the growth in mining. The story is similar for British Columbia, where forestry appears to be the impetus for manufacturing growth. Although forestry is a small division nationally in terms of employment, British Columbia's share of this division's employment increased markedly during the 1960's. The fact that British Columbia's manufacturing sector is highly specialized and the fact that its industry mix component in shift-share analysis changed from a negative value during the 1961 to 1969 period to a positive value during the 1969 to 1973 period supports the speculation that manufacturing growth was the result of forestry in that province.

Recommendations

1. The Provincial Government should initiate a policy of long term industrial planning which has a time perspective of five to ten years. The plan should be revised yearly and be the product of the inter-action of all agencies of government concerned with determining and implementing industrial government policy. The plan once formulated should form the basis for more detailed planning of the individual agencies of government.

The long-term planning should not be concerned with developing a blueprint which specifies the annual production schedules for every industry in Manitoba. Even indicative planning which is done in several European countries would not be practical in Manitoba. Nor should the plan be particularly concerned with the setting of targets either at the macro level (such as a desired level of unemployment, desired rate of inflation or desired rate of provincial growth) or at the micro level for particular industries. The objective of planning should be to identify ways the government can improve the performance of the structural rationalizing process given the existing political-economic system.

2. The long term industrial planning activity of the government should contain the following five inter-related features. First, the government needs to establish what is the public interest, a most difficult task. From a practical point of view the government may only be able to establish what is not in the public interest rather than what is in the public interest. Second, the government needs to monitor the trends of change and to evaluate how well the rationalizing activity of the community is in the public interest. Third, it should, as a result of analysis, understand the workings of the evolutionary forces well enough that it can detect the major causes of the deviations of the actual changes from the desired trend. Fourth, the government could devise policy that will alter the rationalizing activity in the proper direction. Fifth, the government should evaluate the effectiveness of its structural rationalization policy measures.

3. A suggested structure for the second and third stages of the planning process namely the evaluation of performance and the understanding of the rationalizing process would be as follows:

a) Owing to the large number of industries and the constant monitoring required, it would be too expensive to subject every industry to in-depth-analysis. As a second best alternative, a set of criteria should be created that could be used as a scanning device to select at any one point in time a few industries to study intensively.

b) Since the ultimate object of the planning is to remove any barriers to the rationalizing process, the scanning criteria should be able, in a preliminary way, to identify those industries which are not growing (or contracting) in Manitoba at their potential rate. Measurement of relative growth rates is then an obvious component of the scanning criteria. Therefore, the growth rate of each industry in Manitoba should be compared to i) the growth of that industry elsewhere in Canada and ii) the growth rate of other industries in Manitoba.

c) A small industry in Manitoba which is growing relatively slowly (or even contracting) will not have the same effect on the over-all performance of the Manitoban economy as would a large industry. Therefore, the relative size of the industry in Manitoba should also be a consideration in the set of scanning criteria.*

d) The relative importance of Manitoba in an industry could also be an important indication of whether or not the current growth rate of that industry in Manitoba will be maintained. The same argument could be made for the relative importance of that industry at the national level in Canada's total economic activity. Therefore, the relative size of Manitoba in an industry and the relative size of the industry at the national level compared to Canada's overall size should be part of the set of scanning criteria.

e) Shift-share analysis is a simple technique which can be easily employed and which will aid in the selection of industries that should be subjected to further study. In addition, it can be used to indicate the influence of macro forces on the province compared to other provinces. Therefore, shift-share analysis should be part of the set of scanning criteria.

f) The selection of an industry for intensive study should, in part, depend upon the scope of the market for its products and the current pattern of trade. Therefore, the degree of dependence of local producers on local markets as measured by the level of exports, and the degree of dependence of local markets on local producers as measured by the level of imports, should be part of the set of scanning criteria.

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* One must be careful on this point. A small fast-growing industry in Manitoba may have the potential of growing into a large industry if a few barriers can be removed at an early stage of its development. Nevertheless, the short term repercussions of ignoring a small industry will not be large.

g) All of the above suggested criteria would have to be used together if the analyst were to be able to artfully (as opposed to scientifically)* select those industries which would potentially benefit most from a more intensive analysis.

h) The measurement of criteria (a) through (f), data permitting, should be done in terms of employment and value added. The results in terms of relative sizes of industries could be different for the two measures but the results in terms of changes in relative sizes will probably not be; abrupt changes in the ratio of value added to employment are not common. Nevertheless, a comparison of the trends by both measures would allow one to determine whether or not abrupt changes in growth by either measure were the result of growth in demand for the products or of changing production techniques.

i) Although the scanning criteria could be used for the entire provincial economy, it would be better to apply the scanning criteria to each division separately.

4. Following directly from recommendation 3 (f) it is recommended that steps be taken to gather statistics on imports and exports by industry for the province of Manitoba. Quite apart from the need of such statistics for the proposed industrial planning program, such data would be useful information to a large number of people. It is recommended that the Provincial Government strongly encourage Statistics Canada to generate on an annual basis such a series of statistics. If it becomes obvious that Statistics Canada will not produce such data then the Province of Manitoba, perhaps through the Manitoba Statistics Bureau, should investigate the feasibility of producing such a series of data.

5. The Province of Manitoba should initiate studies to analyze macro forces and macro government policies to discover why Manitoba appears to be an unattractive location for manufacturing expansion. For instance, the Government could investigate the allegation that due to existing provincial government policies and programmes, manufacturing firms are re-locating their plants and/or reducing the volume of production in local plants in preference to plants outside the province. Such a study should first identify the extent of re-location and whether or not the current rate of re-location is significantly different

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[*] Despite assertions to the contrary by many members of the discipline, economics, especially applied economics is still basically an art not a science. The methods of science ,although valuable, can only take the analyst so far.

from historic trends. Second, the study should attempt to identify the causes of such an exodus. As a second example the Government could investigate the allegation that there is currently a "flight of capital" from Manitoba due to the provincial inheritance tax. Such a study should not only investigate the truth of such an allegation but it should also study the overall impact of capital movement on the Manitoban economy. As a third example the Government could investigate the allegation that the high cost of transportation impedes the development of manufacturing in Manitoba. Even if these allegations are proven correct, in light of its own perception of the public interest, the Government may elect not to alter its present policies. However, such decisions will then, at least, be made on rational grounds. Also, such studies may reveal reforms that can be made which will reduce the harmful effects of these allegations without harming other aspects of the public interest.

6. (a) The Governments policy for the development of manufacturing within the province should consist of a series of complementary policies to promote the development of a certain few key industries and the cluster of industries associated with each of the selected key industries. This proposed policy is in contrast to the current policy, as perceived by EDAB, of aiding the growth of manufacturing on a company by company basis, a policy which could be described as the shot-gun approach.

(b) The selection of a key industry and its cluster of industries should be made on the basis of a thorough examination of the potential for growth and long run viability of such a cluster and of the repercussions of such growth on the quality of life in Manitoba.

(c) The policy measures used should be designed to remove barriers that impede the structural rationalizing process from developing, in an evolutionary way, the desired cluster of industries. Government policy should not create the cluster of industries, but rather should create the environment that would allow the existing political-economic system to create the desired cluster. The spirit of this recommendation can be stated in another way. A common question asked whenever development is discussed is: if an industry really has the potential for growth why has it not grown by itself? The task for government should be to first be sure the potential is there, then find out the 'whys' and remove them.

7. The structural rationalization process of other divisions besides Manufacturing require close study. In particular, the Services Division (which includes Finance, Insurance and Real Estate, Commercial, Business and Personal Services, and Public Administration) and the Agriculture Division. It is in these two divisions were structural changes have been the most rapid in the past and every indication points towards continued rapid change. The Service Division is large and fast growing in every province. The Agriculture Division is relatively large and contracting relatively quickly in Manitoba.

8. On the basis of our research, using the scanning process, into only two groups of manufacturing industries, (the Metal Fabricating Industries and the Transportation Equipment Industries), there are two industries which should be given first priority for further intensive industry level analysis. They are the Metal Stamping, Pressing and Coating Industry (S.I.C. #304) and the Truck Body and Trailer Manufacturers Industry (S.I.C. #324). Four other industries would also be interesting to study but should be given a lower priority. They are the Wire and Wire Products Manufacturers Industry (S.I.C. #305), the Hardware, Tool and Cutlery Manufacturers Industry (S.I.C. #306), the Motor Vehicles Manufacturers Industry (S.I.C. #323) and the Motor Vehicles Parts and Accessories Manufacturers (S.I.C. #325).

9. The industry level study should of course, investigate such things as the market potential for the Manitoban production, production costs, labour requirements, direct and indirect income generation, level of wages paid to individual workers, optimal location within the province, and the impact of the industry on the environment. However, particular emphasis should be put upon the institutional aspects of the markets and quasi markets the industry in question would be involved in. Quasi markets refer to intra-company relationships between plants and the institutional aspects of the quasi markets would include such things as the degree of vertical and horizonal integration of a firm, and the nature and degree of plant specialization within the firm. Institutional aspects of the markets would include such things as the distribution of market power of the firms in the industry and the source of such power. The identification of the source of such power would require knowledge of such things as relative size of the firms within the relevant markets, the ownership of the firms, the location of the head offices, the extent of inter-locking directorates, the nature of any implicit or explicit cartel argreements that may exist, the relative

size of any conglomerates or cartels that control any of the firms in question or the nature of the existing marketing or distribution system. In essence, if the government is to introduce effective structural rationalization measures it must be aware of the factors that act as barriers to the rationalizing process evolving in the desired way and many of the barriers are due to existing institutional arrangements.

10. Although this study used the Markov Chains Analysis to forecast structural shifts, it is the opinion of the EDAB that such forecasting on a continuous basis is not warranted. However, the fruitfulness of a behavioral model for forecasting should be investigated. The advantage of a behavioral model is that the forecasted structure would be sensitive to a variety of expected changes including government policy. The Provincial Government could either build a model of its own or investigate the possibility of adapting existing models such as the Candide Model of the Federal Government.

APPENDIX

Shift-Share Analysis

Shift-Share analysis centres about a mathematical identity or truism which says that the difference between the rate of growth of a division in a province and the rate of growth of the entire Canadian economy is equal to the national rate of growth for that division relative to the Canadian economy and to the provincial rate of growth for that division relative to the national rate of growth for that division. Using the vocabulary normally associated with the identity, we would say that the 'net relative change' is equal to the 'industry effect' and the 'regional (or competitive) effect'. The object of the analysis is to discover how much of the net relative change is due to the growth performance of the division, compared to all divisions nationally on average (the industry effect) and how much of it is due to the growth performance of the division provincially compared to the same division at the national level (the regional effect).

It is possible to aggregate the shift-share equations for every division within a province. The aggregation describes how much of the difference between the provincial economy's rate of growth and the national economy's rate of growth, (the net relative change) is due to the industry mix effect and how much of it is due to the regional or competitive effect.

Shift-Share Analysis is purely a descriptive technique and offers no explanation as to why growth rates differ. However, the method of description is such that a clear indication is given as to where one should look to find the explanations for the differences in growth performance. If, for instance, a province is growing slowly relative to Canada and the industry mix effect is large (and negative), then the cause(s) of the poor provincial growth rate probably are due to the forces that created the particular mix, in terms of relative size, of the divisions within the province. On the other hand, if the regional or competitive effects component is large (and negative) then the causes of the poor provincial growth rate are probably due to conditions that discourage growth of any kind in the province; the province is not competing well.

The description of shift-share analysis has been in terms of comparing the growth of divisions within a province to the Canadian economy's growth rate. Research Paper No. One in fact analyzes each province in this way. However, it is possible to use the same technique on different data bases. For instance Research Paper No. Three which is concerned only with the manufacturing divisio uses the shift-share analysis to compare the rates of growth of each manufacturing industry in a province to the national rate of growth of the manufacturi sector. Thus, shift-share analysis can be used to describe how much of the difference in the rate of growth of an industry within a province and the natio al rate of growth for the manufacturing division is accounted for by the nation rate of growth of that particular industry and how much of the difference is accounted for by provincial rate of growth relative to the national rate of growth for that industry.

An algebraic explanation of shift-share analysis is as follows:

Let

$E_{ij} \equiv$ Employment of industry i in province j for the year, beginning the period of analysis

$E_{ij}^{1} \equiv$ Employment of industry i in province j for year ending the period of analysis

Since

$\frac{\Delta E_{ij}}{E_{ij}^{o}} \equiv$ Percentage rate of growth of employment for any industry i in any province j divided by 100

$$= \frac{E_{ij}^{1} - E_{ij}^{o}}{E_{ij}^{o}}$$

And

$\frac{\Delta E_{j}}{E_{j}^{o}} \equiv$ Percentage rate of growth employment for any province j divided by 100

$$= \frac{E_{j}^{1} - E_{j}^{o}}{E_{j}^{o}} = \frac{\Sigma_{i} E_{ij}}{\Sigma_{i} E_{ij}}$$

And

$\frac{\Delta E_i}{E_i^o}$ = Percentage rate of growth of employment for any industry i for all of Canada divided by 100

$$= \frac{E_i^1 - E_i^o}{E_i^o} = \frac{\sum_j \Delta E_{ij}}{\sum_j E_{ij}^o}$$

And

$\frac{\Delta E}{E^o}$ = Percentage rate of growth of employment for all industries in Canada divided by 100

$$= \frac{E^1 - E^o}{E^o} = \frac{\sum_i \sum_j \Delta E_{ij}}{\sum_i \sum_j E_{ij}^o}$$

Therefore:

$\frac{\Delta E_{ij}}{E_{ij}^o} - \frac{\Delta E}{E^o}$ = The difference in the rates of growth for any industry i in any province j and Canada considered as a whole . . . . (1)

By adding and subtracting $\frac{\Delta E_i}{E_i^o}$ to equation (1) we can write

$$\frac{\Delta E_{ij}}{E_{ij}^o} - \frac{\Delta E}{E^o} = \frac{\Delta E_i}{E_i^o} - \frac{\Delta E}{E^o} + \frac{\Delta E_{ij}}{E_{ij}^o} - \frac{\Delta E_i}{E_i^o} \quad . . . . (2)$$

OR

The difference in the rates of growth for any industry i in any province j and Canada	=	The difference in the national rate of growth of industry i and Canada's rate of growth	+	The difference in the rates of growth for industry i in province j and the national rate of growth for industry i
	=	Industry Effect	+	Regional or Competitive Effect

Multiplying (2) by E_{ij}^{o} we get

$$\Delta E_{ij} - E_{ij}^{o}\frac{\Delta E}{E^{o}} = E_{ij}^{o}\left[\frac{\Delta E_i}{E_i^{o}} - \frac{\Delta E}{E^{o}}\right] + E_{ij}\left[\frac{\Delta E_{ij}}{E_{ij}^{o}} - \frac{\Delta E_i}{E_i^{o}}\right] \ldots($$

OR

Net Relative Change = Industry Effect + Regional or Competitive Effect

From (2) it can be seen that the difference in percentage points between the rate of growth of any industry i in any province j and the rate of growth for the economy as a whole is equal to how well the industry in question does nationally compared to the rate of growth for Canada (the industry effect) and as to how well the industry does in the province compared to the rate of growth of the industry nationally (the regional or competitive effect).

From (3) it can be seen that the difference in absolute numbers (the net relative change) between the actual increase in employment for industry i in province j; (ΔE_{ij}) and what the change would have been ($E_{ij} \times \Delta E/E^{o}$) is equal to the industry effect and the regional effect, again in absolute numbers. In other words, the net relative change is the sum of the industry effect and the regional effect.

An example may prove useful. From 1961 to 1969 the Fabricated Structural Metal Industry increased its employment from 765 to 1,118 (46.1%) in Manitoba. During the same period, Canada's employment grew by 23.8% and the Fabricated Structural Metal Industry grew nationally by 32.0%.

Therefore:

Net Relative Change = Industry Effect + Regional Effect

OR

(1,118 - 765)- 765(0.238) = 765(0.32 - 0.238) + 765(0.461 - .032)

353 - 230 = 15 + 108

123 = 15 + 108

In other words, from 1961 to 1969 this particular industry increased its labour force by 353 jobs which was 123 more jobs than it would have created if it had grown only at the national rate. Of these 123 jobs, 8 jobs were due to the fact that the industry at the national level was growing (marginally) faster than Canada was (industry effect) and 108 of the jobs were due to the fact that the industry in Manitoba was growing faster than national rate for the industry (regional effect).

Equations (2) and (3) are for individual industries within a province. It is possible to sum each such equation for the entire province in order to arrive at a shift-share equation for the province.

For instance, summing (3) we get

$$\sum_i \Delta E_{ij} - \sum_i \left[E_{ij} \cdot (\Delta E / E^o)\right] = \sum_i \left[E_{ij} \cdot \left(\Delta E_i / E_i - \Delta E / E^o\right)\right] + \quad \ldots(4)$$

$$\sum_i \left[E_{ij} \cdot \left(\Delta E_{ij} / E_{ij}^o - \Delta E_i / E_i^o\right)\right]$$

OR

$$\Delta E_j - E_j^o \left(\Delta E / E^o\right) = \sum_i \left[E_{ij} \cdot \left(\Delta E_i / E_i^o - \Delta E / E^o\right)\right] +$$

$$\sum_i \left[E_{ij} \left(\Delta E_{ij} / E_{ij}^o - \Delta E_i / E_i^o\right)\right]$$

OR

Net Relative Change + Industry Mix Effect + Regional Competitive Effect

The interpretation of this equation is similar to (3) except it refers to the Province. There are however, two significant differences: first, the industry mix effect is the summation of the industry effects and as such is a measure of how well the structure of industry in the province compares to the Canadian structure of industry. If the province has a higher proportion of growth industries in its structure than the nation, considered as a whole, then the industry mix effect will have a positive value.

Second, the competitive effects component, because it is a summation of the weighted competitive effects of the individual industry equations, is influenced by the industry mix.

Finally, it should be noted that some authors like to write equation (4) in the following way.

$$\sum_i \Delta E_{ij} = \sum_i \left[E_{ij} \cdot \left(\Delta E / E^o \right) \right] + \sum_i \left[E_{ij}{}^o \cdot \left(\Delta E_i \;/\; E_i{}^o \;-\; \Delta E \;/\; E^o \right) \right] \qquad \ldots(5)$$

$$+ \sum_i \left[E_{ij} \cdot \left(\Delta E_{ij} \;/\; E_{ij}{}^o \;-\; \Delta E_i / E_i \right) \right]$$

In other words, (5) says that the change in employment for province j is equal to the sum of national effect, the industry effect and the regional (or competitive) effect.

PART TWO

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Research Paper #1

"Structure of Industry in Canada - At Division Level"

By
John McGuire
and
Carole Swan
Spring 1976

Structure of Industry in Canada - At the Division Level

A) Introduction

- I Purpose
- II Findings
- III Summary and Implications for Policy

B) Industrial Structure

- I Canada
- II Manitoba Structure
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A) INTRODUCTION

The main body of this paper begins with Part (B); Part (A), which is really only a summary of Part (B), contains a brief statement of the purpose of this particular paper, then a listing in point form of the main findings of the analysis contained in Part (B) and finally a summary including some implications of the findings for policy formation.

I Purpose

As stated in the introductory paper, the main purpose of this research project is to identify some of the major rationalizing trends, over time, in the Canadian and Manitoban economy. Although the main focus for analysis is to be the manufacturing division, it is fruitful to survey all economic activity first in order to give the analysis on the manufacturing sector some perspective. The objective of this paper is to provide that perspective. Rationalization trends will be analyzed by comparing relative growth rates as measured by employment of all economic activity at the divisional level (or at the one digit level of aggregation). The primary emphasis will be on the years 1966 to 1974.

The choice of the period and of the unit of measurement was essentially pragmatic. Employment statistics, or more precisely estimates, of the labour force by division and province are the only statistics available on an annual basis; even these statistics are not reliable to any degree before the year 1966. However, other statistics will be used where appropriate in the analysis.

II Findings

1. From 1966 to 1974 total employment in Manitoba grew by 12.6%, significantly less than the Canadian average of 22.4% and lower than most of the provinces as well; it ranked eighth, ahead only of Nova Scotia (11.1%) and Saskatchewan (5.8%). The fast growing provinces were British Columbia (38.4%), Ontario (27.0), Alberta (25.5%) and Newfoundland (23.6%)(see Table 10, p. 94).

2. In Canada as a whole, and in most provinces as well, the Service division was the largest and fastest growing sector. Manufacturing, the second largest sector in Canada, grew slowly and declined in relative size. The next two largest sectors in Canada, Trade and Transportation, and Communications and Utilities, grew at approximately the national average and thus maintained their share of total employment. The three smallest sectors (Construction, Agriculture and Other Primary Industries), with the possible exception of Construction, were shrinking in relative importance. Agriculture actually shrank in absolute terms as well (see p. 78).

3. Four hypotheses to explain the rapid growth in the service sector were tested in a non-rigorous way and all four were found to have some validity. These hypotheses were:

(a) As level of personal income increases, the share of consumer expenditures spent on services increases;

(b) The rate of labour productivity increase is not as high in the service sector as in other sectors of the economy. Therefore, as the demand for services increases, labour force growth in the service sector must be relatively high to compensate for poor productivity performance;

(c) As an economy grows the potential for specialization increases. Therefore, there is a tendency for services which were previously 'in-house' to be contracted out. Thus, the growth of the labour force in the service sector over-estimates the increase in demand for services;

(d) As an economy grows in size and complexity, the bureaucracy necessary to administer and co-ordinate activity increases more than proportionately. In economic parlance, this phenomenon is called management diseconomies to scale (see pp 81 - 86).

4. Differences in rates of employment growth among provinces for the period 1966-1974 do not appear to be the result of any apparent specialization trends. In fact, judging from observation of the specialization co-efficients over time there appears to be a homogenizing trend (spearheaded by the strong influence of the large and fast growing service sector in all provinces)

whereby the provinces are demonstrating a tendency to more closely approximate each other in structure (see pp. 87 - 90).

5. Evidence provided by the specialization co-efficients is reinforced by shift share analysis which demonstrate that the industry mix component was over-shadowed in importance in every province by the competitive effects component. In other words, differences in the rate of growth between provinces was due not so much to differences in structure but rather to the ability of some provinces to grow faster in all divisions than other provinces (see pp.92-94).

6. Findings #2, #4 and #5 imply that a relatively fast growing province was relatively fast growing in all divisions and conversely, a relatively slow growing province was growing relatively slowly in all divisions. Therefore, one would expect the 'k' ratios of growth rates* for any division to be approximately the same for all provinces. Also, due to the homogenizing trend suggested by the specialization co-efficients, one would expect that where differences in these 'k' ratios appear, one would expect the larger 'k' ratio values to be for the provinces with a smaller proportional share of the provincial labor force in that particular division than the average. These implications were investigated and found to be substantially true (see p. 97).

7. Although the structures of all the provinces are approximately the same, it is still possible to have a trend towards increasing economic activity in the Axis area. Under such circumstances the Axis would look the same as all other areas except that it would be getting relatively bigger over time. Although a high level of the total economic activity was in Ontario and Quebec during the period 1951 to 1974, no significant increase in this concentration was observed. Examination of the Axis area was possible only for the years 1961 and 1971 (the Census years). Although the Axis did have a large share of each division's national employment - with the one exception of the primary industries - there was no significant shift in economic activity to this region (see p. 89).

8. Within Manitoba, Agriculture and Manufacturing displayed the greatest divergence from national trends. Agriculture was relatively larger in this province than it was in Canada and contracted faster in Manitoba than it did

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* The 'k' ratio is defined as the growth rate of a particular division within a province divided by the growth rate of that province. For instance Manitoba's Agriculture 'k' ratio would be Growth of Agriculture in Manitoba/Growth of Manitoba.

on average for the country. Manufacturing in Manitoba was relatively smaller than its Canadian counterpart and grew more slowly than the average rate for manufacturing in Canada (see Table 11, p.95).

III Summary and Implications For Policy

1. Distribution of Employment Within the Provinces

The economic structure as measured by the distribution of employment by division, varies from province to province. However, given the differences in the sizes of the provinces and despite the common perceptions of the main economic activities of each of the provinces, the differences in the distributions of employment are not that great. In addition and as a broad generalization, the differences tend to narrow over time. That is, if within any given province a particular division has a relatively smaller share of provincial employment than it does on average elsewhere, then the ratio of the growth rate of that division in the province divided by the growth rate of the province will be greater than the ratio of the growth rate of that division at the nation level divided by the national growth rate. (For the sake of identification, we have called to these ratios, 'k' ratios.) This has the effect of increasing that division's share of provincial employment relative to that division's share of national employment.

Manufacturing in Manitoba can be used as an illustration. In 1966 manufacturing in Manitoba was relatively smaller than it was in the nation as a whole (15.9% compared to 24.4%). Thus for the period 1966 to 1974 we would expect the manufacturing 'k' ratio for Manitoba to be greater than the manufacturing 'k' ratio for the nation. Our calculations show that the 'k' ratios were 0.58 and 0.57 respectively. Thus, the share of manufacturing in Manitoba has increased relative to the share of manufacturing nationally. In 1974 the shares were 14.6% and 22.2%, Although the differences in the 'k' ratios are not large, manufacturing was chosen for illustrative purposes for another reason. Another measure which is simpler and which on the surface appears to be a better measure is in fact not suitable. It can be argued that if a division within a province such as manufacturing in Manitoba is smaller relative to its size nationally, one would expect the growth rate of that division within the province to be faster than the provincial growth rate. If such were the case, then of course, the relative size of the division in the province would increase. However, that is not the only way the relative size of the division in the province can approach its relative size at the national level. If, as in the case of manufacturing, the national share of a division is shrinking over time (24.4% in 1966 and 22.2% in 1974) then the relevant 'k' ratio will be less than one (0.57) for manufacturing. Under such circumstances, it is possible for the division in question to also be shrinking in relative size within the province, as in the case of manufacturing in Manitoba (15.9% in 1966 and 14.6% in 1974). However, if it is shrinking at a slower rate within the province, with a 'k' ratio larger than the relevant national 'k' ratio, then the difference in the share of the division at the provincial and national level will narrow. In other words, the 'k' ratios are a more general measure of the homogenizing trend than the simpler measure mentioned suggested above.

Agriculture can be used as a second illustration. In 1966, agriculture accounted for 15.0% of all employment in Manitoba and 7.6% of all employment in Canada. The 'k' ratio for agriculture in Manitoba for the period 1966 to 1974 was -3.29% and for Canada was -1.63%. Therefore, although agriculture was contracting in both jurisdictions (as indicated by the negative signs of the 'k' ratios), Manitoba was contracting at a quicker rate and as a result the differences in the shares of agriculture in the two jurisdictions narrowed. In 1974, agriculture accounted for 10.2% and 5.2% of total employment in Manitoba and Canada respectively.

The similarity and growing similarity of the provinces over time is also indicated by the specialization co-efficients. The specialization co-efficients, which measure how closely the provinces resemble the national economy in structure, all tend to be approaching zero over time. This trend indicates growing similarity in structure.

2. Relative Sizes of the Provinces

To say that the provinces are similar in appearance, and are becoming increasingly so, does not imply that the provinces are becoming more equal in size or that the divisions are becoming more equal in size. In fact, the relative sizes of the provinces have remained comparatively stable in aggregate and in each division over the period of analysis. There were some shifts however. Central Canada's (Ontario and Quebec) share of total employment was large but relatively stable over time. In 1951, this area accounted for 64.8% of total employment; in 1961 and 1971 the shares were 64.3% and 64.0% respectively. These shares were similar to Central Canada's share of total population. In the southern parts of Ontario and Quebec, - an area identified as the Axis by M. Yeats, Main Street (Toronto: The MacMillan Company of Canada Limited, 1975), the share of total employment in 1961 and 1971 was 56.3% and 57.5% respectively. The Maritimes' share fell from 9.7% in 1951 to 8.1% in 1971; British Columbia's share rose from 8.1% to 10.5% during the same period; the Prairie's share was 17.4% in 1951, 17.9% in 1961 and 17.1% in 1971. Manitoba's share declined somewhat from 5.4% in 1951 to 4.8% in 1971. Shifts of similar magnitudes can be observed at the divisional level as well. If any trend can be discerned from these slight movements it is this one: economic activity as measured by employment seems to be moving slowly towards Ontario, British Columbia and Alberta and away from the other provinces. Whether the movement out of Manitoba is towards Ontario or Alberta and British Columbia or both would require more research.

Shift share analysis is a technique that can be used to give some further information about the nature of these shifts. The technique breaks down the differential in the growth rate of a province and the national growth rate into two components, namely the industry mix component and the competitive effects component. A positive differential in the growth rates implies that the province's share of employment has increased and a negative differential implies that the province's share has decreased.

Shift share analysis for the period 1966 to 1974 indicates that the competitive effects component was responsible for a larger portion of the differential in growth rates (referred to as Net Relative Change) than was the industry mix component for all provinces. This fact indicates that the relative growth performances depended more on how well the provinces competed within each of the divisions, rather than the particular mix of the divisions they had. This finding is consistent with the finding that the structures of all the provinces were similar.

Finally, consistent with both the findings of the shift share analysis and of the relatively similar provincial distribution of employment by divisions was the finding that, generally speaking, if a province was growing faster than the nation, each of its divisions was growing faster than the national growth rate for the comparable division and vice versa. In other words, no one division was responsible for the growth performance of a province. If a province was growing relatively well so were all its divisions. Such a finding does not discount the 'leading sector' theory of growth but it does imply that if there is a leading sector the spread effects are pervasive.

All of the evidence presented to this point in the summary suggest that efforts to facilitate growth within any province should be directed towards macro policies rather than specific policies designed to help particular divisions. Macro policies would include such things as manpower policies(including migration policies) transportation policies,taxation policies(including tariffs, income and capital tax policies) policies influencing the availability and costs of investment funds and policies influencing the level of entrepreneurship.

3. Relative Sizes of the Divisions

The Service Sector, which includes Finance, Insurance and Real Estate Services, Commercial, Business and Personal Services and Public Administration, is the largest and fastest growing division in Canada and in each of the provinces. This division accounted for 37.7% of all employment in 1974 in Canada and 30.1% of the real domestic product in 1971 in Canada. The next two fastest growing divisions, the Wholesale and Retail Trade Division and the Transportation, Communication and Utilities Division, could also be considered service producing, as opposed to goods producing, sectors. When these two service divisions are added to the Service Division, the service producing sectors' share of economic activity in 1974 rises to 63.6% in terms of employment and to 67.8% in 1971 in terms of real domestic product. However, it should be noted, that for Canada as a whole, these last two divisions grew at a rate comparable to the over-all national rate during the 1966 to 1974 period and thus did not appreciably change in relative size.

The goods producing sectors, such as manufacturing, construction, agriculture and other primary industries, all grew at a rate below the national average in employment growth and hence shrank in relative size during the 1966 to 1974 period. Agriculture's employment contracted in absolute numbers as well as in relative terms. The same trends can be observed when growth is measured by changes in real domestic product and over a longer time period (1941 to 1971).

Apart from measurement problems, there are at least four possible explanations for the relatively quick growth of the service sector. Although no attempt was made to rigorously verify these explanations, it was possible to present some evidence which at least added some credence to the explanations. First, it has been argued that as the income per capita rises in a nation, services as opposed to goods become an increasingly larger part of consumer demand. Second, it has been argued that the rate of productivity increase within the service sector is not as high as it is elsewhere. Therefore, with growth this sector must employ an increasing share of the work force even to maintain its share of G.N.P. Third, as an economy grows, the opportunity for increased specialization often means it is more efficient for a goods producing firm to'contract out' many services (such as marketing research and personnel recruitment) which it had previously performed 'in-house'. Therefore the relative volume of services is not really increasing but merely more efficiently segregated in the national accounts. Finally it can be argued that management diseconomies to scale exist; as an economy grows, the bureaucracy required to monitor, co-ordinate and regulate activity increases more than proportionately.

4. Manitoba

From 1966 to 1973 total employment in Manitoba grew by 12.6%, significantly less than the Canadian average of 22.4% and lower than most provinces as well; it ranked eighth, ahead only of Nova Scotia (11.1%) and Saskatchewan (5.8%). Shift share analysis reveals that only 12% of the differential in growth rates between Canada and Manitoba was due to the industry mix component while 88% was due to the competitive effects component. In terms of actual employment, there would have been 33,000 more jobs in Manitoba if it had grown at the national rate, 29,000 of which was due to the competitive effects component.

The service sector was the largest (39.9% of total provincial employment in 1973) and the fastest growing (37.5%). This rapid growth was primarily due to the industry mix component. In fact, the competitive effects component was a slight drag on the rate of growth. If the service sector had grown in Manitoba at the same rate it did elsewhere, 19,000 new jobs would have been created, over and above the increase due to average national growth. However, the competitive effects component reduced this by 2,000 to 17,000 jobs. This information can be interpreted to mean that the service sector in Manitoba was growing quickly for the same reasons it was growing quickly nationally. If anything,. any influences unique to the province impeded growth in this sector.

Every division, including the Service Sector, grew more slowly in Manitoba than it did at the national level,(negative competitive effects component). This fact is consistent with the general observation that if a province grew more slowly than the nation, then every division grew more slowly in the province than it did at the national level.

To have a negative sign for the competitive effects component of a division which is declining in relative size nationally (a negative industry mix component) is not necessarily an indication that the province is uncompetitive. In fact, to be declining relatively quickly in a division which is declining could be an indication of good competitive conditions. One cannot really know without further investigation whether or not the province is acting competitively.[*] Manufacturing, Agriculture and Other Primary Industries were the three divisions in Manitoba which had negative signs for both components. On the other hand, to have a negative competitive component when there is a positive industry mix component is a stronger indication, a priori, that the province is not competitive. In Manitoba, such was the case for the Services, Trade, and Transportation, Communications and Utilities divisions during the period 1966 to 1973 (see Table 11).

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[*] Competition or competitiveness have a variety of meanings. First, they can refer to the structure of the industry in terms of the number of competitors or relative size of the competitors. Second, they can refer to whether or not the firms in the industry behave in a competitive or rivalous way. Third, a firm or a region could be considered as competitive if its share of market sales is increasing. Fourth, an industry or a firm could be defined as competitive if it is efficient. Efficiency includes the possibility of contracting in size if conditions demand it. Fifth, competition can be viewed as a mechanism or form of social control over private behaviour. There are other possible meanings as well. The competitive effects component is a measure of the third definition of competition; it says little about the other concepts.

B) INDUSTRIAL STRUCTURE AT THE DIVISION LEVEL

I Canada

The Service sector was the largest and fastest growing employer during the 1966 to 1974 period. Beginning with 32.8% of all employment in 1966, this sector grew by almost 50% and accounted for 37.7% of the employed labour force in 1974. Manufacturing, the second largest employer during this period, grew relatively slowly (16.1% compared to 27.7% for the economy as a whole) and thus shrank in relative importance in terms of size. In 1966, 24.4% of total employment was concentrated in the Manufacturing sector; by 1974 this figure had fallen to 22.2%. The next two largest sectors, the Trade sector and the Transportation, Communication and Utilities sector, grew at rates comparable to the over-all national growth rate and thus maintained shares of employment of approximately 17% and 9% respectively. The other three sectors (Construction, Agriculture and Other Primary Industries) were small employers and, with the possible exception of Construction, were shrinking in relative importance. It is interesting to note that the largest divisions also tended to be the fastest growing divisions and that Agriculture actually declined in size both absolutely and relatively (see Table 1).

Inferences from these trends must be made with caution; the choice of employment as a measure of performance, the reliability of the employment data used,* and the method of summarizing data into categories may all have influenced the observed trends. For instance, when the Labour Force Survey statistics are compiled into the two categories of 'goods producing' and 'service producing' activities the trend of employment shift (in a relative sense) from the goods

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* The data were obtained from the Labour Force Survey of Statistics Canada and were based on a sample survey. Hence, the reliability of the data depends upon the reliability of the sample used. In some divisions in some provinces the level of statistical confidence is not high.

'Part B'

TABLE 1

C A N A D A
INDUSTRIAL STRUCTURE AT THE DIVISIONAL LEVEL, 1966-1974
(EMPLOYMENT)

DIVISION	EMPLOYMENT ('000)			RELATIVE SIZE						GROWTH					
	1966	1970	1974	1966 (%)	RANK	1970 (%)	RANK	1974 (%)	RANK	1966-74 (%)	RANK	1966-70 (%)	RANK	1970-74 (%)	RANK
Service	2343	2876	3445	32.8	1	36.5	1	37.7	1	47.0	1	22.7	1	19.8	2
Fin., Ins., & Real Est.	302	365	446	4.2		4.6		4.9		47.7		20.9		22.3	
Com. Bus. & Personal	1622	2025	2386	22.7		25.7		26.1		47.1		24.8		17.8	
Public Admin.	419	486	613	5.9		6.2		6.7		46.3		16.0		26.1	
Manufacturing	1744	1790	2024	24.4	2	22.7	2	22.2	2	16.1	5	2.6	4	13.1	5
Trade	1180	1320	1575	16.5	3	16.8	3	17.2	3	33.5	2	11.9	2	19.3	3
Trans., Comm. & Utilities	620	692	790	8.7	4	8.8	4	8.6	4	27.4	3	11.6	3	14.2	4
Construction	499	471	598	7.0	6	6.0	6	6.5	5	19.8	4	-5.6	6	27.0	1
Agriculture	543	511	473	7.6	5	6.5	5	5.2	6	-12.9	7	-5.9	7	-7.4	7
Other Primary	224	218	234	3.1	7	2.8	7	2.6	7	4.5	6	-2.7	5	7.3	6
TOTAL	7153	7879	9137							27.7		10.1		16.0	

Source: Derived from Labour Force Survey Data, obtained from Statistics Canada

C A N A D A

TABLE TWO

INDUSTRIAL STRUCTURE AT THE DIVISIONAL LEVEL

(REAL GROSS DOMESTIC PRODUCT)

DIVISION	REAL GDP (Millions of dollars)				RELATIVE SIZE				GROWTH		
	1941	1951	1961	1971	1941	1951	1961	1971	1941-51	1951-61	1961-71
					%	%	%	%	%	%	%
Services			10703	17088	NA	NA	32.1	30.1	NA	NA	59.7
Fin., Ins., & Real Estate	NA	NA	3532	5217	NA	NA	10.6	9.2	NA	NA	47.7
Com. Bus. & Personal	2095	3189	4655	8500	17.0	17.4	14.0	15.0	52.2	46.0	82.6
Public Admin.	NA	NA	2516	3371	NA	NA	7.5	5.9	NA	NA	134.0
Manufacturing	3978	5857	8501	15302	32.3	32.0	25.5	27.0	47.2	45.1	80.0
Trade	1777	2964	4653	7924	14.4	16.2	14.0	14.0	66.8	57.0	70.3
Trans., Comm. & Util.	1613	2477	4190	7781	13.1	13.5	12.6	13.7	53.6	69.2	85.7
Construction	602	1030	1823	2897	4.9	5.6	5.5	5.1	71.2	77.0	58.9
Agriculture	1462	1712	1581	2414	11.9	9.3	4.7	4.3	17.1	-7.7	52.7
Other Primary	800	1084	1900	3286	6.5	5.9	5.7	5.8	35.5	75.3	72.9
Forestry	206	351	355	479	1.7	1.9	1.1	0.8	70.6	1.2	35.0
Fishing & Trapping	78	103	100	108	0.6	0.6	0.3	0.2	32.8	-3.2	8.0
Mines	516	630	1445	2699	4.2	3.4	4.3	4.8	22.1	129.4	86.8
TOTAL	12327	18313	33351	56692	100	100	100	100	48.6	82.1	70.0

Source: Calculated from: #13-201 Statistics Canada, "National Accounts, Income and Expenditure, 1967", Table 21, p.30
#11-505 Statistics Canada, "Canadian Statistical Review, Historical Summary, 1970" Tables 2.1
and 2.2, p. 31 - 33

producing sectors (i.e. Manufacturing, Construction, Agriculture and Other Primary) to the service producing sectors (i.e. Service, Trade and Transportation, Communications and Other Utilities) is even more pronounced. The service producing sector's share of total employment increased from 57.9% in 1966 to 63.6% in 1974; such a trend is neither new in Canada nor exclusive to Canada (see Table Three).

One argument often advanced to explain this trend is that as an economy matures, services, as opposed to goods, become an increasingly larger share of consumer demand. A second common explanation states that the rate of productivity increase within the service sector is not as high as elsewhere and therefore this sector must continually employ an increasing share of the work force to maintain its share of G.N.P. A third possible reason for the shift from goods producing to service producing sectors is the increase in specialization which follows the expansion of the economy as a whole; for specialized activities (such as consulting firms and production specialists) it becomes more efficient for a firm to 'contract out' many of the services it had previously performed 'in-house'. Therefore, the relative volume of services is not really increasing; instead a more definite segregation between goods producing and service producing activity is developing. Fourth, it is commonly argued that as an economy grows, the bureaucracy required to monitor, co-ordinate and regulate activity increases disproportionately. A fifth explanation is that the Service Sector has a higher proportion of part-time workers in its labour force than other sectors. If statistics measuring full-time equivalent employment could be developed, the Service Sector's labour force would drop in relative size.

These arguments are not mutually exclusive in the sense that if one is true the others cannot be. However, each of them have different implications for policy formation. Unfortunately,data are not compiled in an appropriate manner to easily allow rigorous identification of the validity of these arguments. (To rigorously pursue proof for these arguments would involve time and would lead us astray from the main purposes of the current research.) Nevertheless, there is some statistical evidence to support them.

For instance, consumer expenditure on services as a proportion of total consumer expenditure has increased at a fairly steady rate from 31.5% in 1951

TABLE 3 GOODS AND SERVICE PRODUCING EMPLOYMENT, CANADA 1966 - 1974

	Goods Producing Sectors		Service Producing Sectors		Total Activity
	Employees	% of Total Emp.	Employees	% of Total Emp.	Employees
1966	3010	41.1%	4142	57.9%	7152
1967	3008	40.8	4371	59.2	7379
1968	2991	40.0	4546	60.0	7537
1969	3053	39.2	4727	60.8	7780
1970	2992	38.0	4888	62.0	7879
1971	3024	37.4	5055	62.6	8079
1972	3056	36.7	5273	63.3	8329
1973	3211	36.7	5548	63.3	8759
1974	3328	36.4	5809	63.6	9137

Source: Derived from Labour Force Survey Data, obtained from Statistics Canada, Ottawa.

TABLE 4 CANADA

CONSUMER SERVICES AS A PERCENT OF TOTAL PERSONAL EXPENDITURE, 1951-1971

Year	Consumer Services Total Personal Expen. in millions of $	Year	Consumer Services Total Personal Expen in millions of $
1951	31.5%	1962	36.9%
1952	32.6	1963	37.0
1953	33.5	1964	37.1
1954	34.8	1965	37.3
1955	34.9	1966	37.9
1956	35.1	1967	38.3
1957	35.8	1968	39.4
1958	36.6	1969	40.0
1959	37.2	1970	40.8
1960	37.9	1971	40.0
1961	37.2		

Source: Calculated from #11-505, "Canadian Statistical Review, Historical Summary, 1970", Table 1.5, p.18

to 40.0% in 1971, lending some credence to the theory that services become an increasingly larger share of consumer demand as an economy matures. The argument that productivity increase within the service sector is not as high as elsewhere is supported by statistics published by the Economic Council of Canada. Factor productivity was 2.25% per annum for Canada as a whole during the period 1946-1969. However, factor productivity in all service producing activities was only .072% per annum and in the Finance, Insurance and Real Estate sector and the Community, Business and Personal Services sector, factor productivity actually declined at a rate of -1.56% and -1.00% per year respectively. (Pattern of Growth, Seventh Annual Review, Economic Council of Canada, 1970, Table A-1, p. 93)

The argument which asserts that growth in services is overstated due to increased specialization is harder to test empirically due to difficulties encountered in attempting to separate compiled data into those services purchased by consumers and those purchased by business. However, some evidence of this bias can be found. It has already been demonstrated that the employment share of Manufacturing in total economic activity has been declining and the share of Trade has been increasing. These trends could be partially explained by the argument that over time manufacturers have become less and less involved with the distribution of their product at both the wholesale and the retail level preferring instead to allow specialized firms to handle this function. If such an argument had any validity, one would expect that the combined share of real domestic product in Manufacturing and Trade (a quasi-service sector of the economy) would remain constant over time. This combined share has in fact remained relatively constant at approximately 40% of total real domestic product for the years 1951 to 1971 (see Table 5).

Finally the argument that as an economy grows in size and complexity, the bureaucracy required to co-ordinate activity must grow at an even faster rate, can be illustrated by examining the growth in government activity. Since we are attempting to measure the growth and size of government bureaucracy necessary to administer, co-ordinate and regulate activity, trends in total government expenditure would be inappropriate since this measure includes transfer payments and capital investments as well as expenditures on goods and services; government expenditure on current goods and services

TABLE 5

CANADA
MANUFACTURING AND TRADE REAL DOMESTIC PRODUCT, 1951-1971

Year	Manufacturing RDP	Trade RDP	Mfg. RDP & Trade RDP / Total RDP
1951	5,857	2,964	39.3%
1952	6,078	3,164	38.2
1953	6,512	3,378	39.3
1954	6,367	3,415	39.5
1955	6,988	3,806	39.4
1956	7,642	4,150	39.7
1957	7,625	4,150	39.4
1958	7,481	4,248	38.6
1959	8,033	4,532	39.4
1960	8,169	4,541	38.9
1961	8,501	4,653	39.4
1962	9,266	4,937	39.8
1963	9,878	5,174	40.0
1964	10,830	5,560	40.8
1965	11,799	6,021	41.4
1966	12,641	6,403	41.4
1967	12,947	6,733	41.4
1968	13,814	7,007	41.7
1969	14,749	7,366	41.9
1970	14,707	7,440	41.0
1971	15,302	7,924	41.1

Source: Calculated from RDP indexes (#11-505, Tables 2.1:2.2, p.31) and GDP at factor cost, 1961, (#13-201, 1967, Table 21, p.30) is a more appropriate measure. Between 1961 and 1974 government current expenditure as a percentage of Gross National Expenditure increased by over 3 percentage points. This lends tentative support to the contention that part of the increase in services producing activity is due to increased government monitoring and co-ordination. It would be interesting to analyze administration costs as a percentage of total cost in the private sector as well.

TABLE 6

GOVERNMENT CURRENT EXPENDITURE AS A % OF GNE, CANADA 1961 - 1976

1961	16.2	1969	17.8	
1962	16.0	1970	19.4	
1963	15.7	1971	19.7	
1964	15.4	1972	19.5	
1965	15.1	1973	18.8	
1966	16.0	1974	19.4	
1967	16.6	1975	20.4	Forecast
1968	17.5	1976	20.1	Forecast

Sources:

1970-76: Bank of Commerce, Commercial Letter, Oct. 1975

1968-69: Bank of Commerce, Commercial Letter, Sept/Oct. 1974

1961-67: Bank of Commerce, Commercial Letter, Sept. 1971

Another method of measuring the relative growth of government bureaucracy is to examine trends of employment in public administration. Between 1966 to 1974 employment in public administration grew by 46.3% (compared to 27.7% for total employment in Canada) and thus the public administration's share of total employment increased from 5.9% in 1966 to 6.7% in 1974 (see Table 1). Although it can be argued that this growth in the public administration sector was due to increased services, it is also consistent with the argument that growth in an economy requires faster growth in the bureaucracy.

II Manitoba Structure

The structure of the Manitoba economy, as indicated by employment distribution between divisions, is quite similar to the structure of the national economy. Differences which do exist between the Manitoba and national structures tend to be narrowing as a result of relative growth rates of divisions. These differences in growth will be examined more closely presently. First, however, some differences in structure will be noted.

Agriculture and Manufacturing are the two divisions which demonstrate the greatest divergence between national and provincial size. Agriculture accounted for 7.6% of Canadian employment in 1966 and 5.2% in 1974. The comparable statistics for Agriculture in Manitoba are 15.0% and 10.2% respectively. Manufacturing, on the other hand, is relatively smaller in Manitoba than it is in Canada. Manufacturing accounted for 24.4% of national employment in 1966 (as opposed to 15.9% in Manitoba) and 22.2% in 1974 (as opposed to 14.5% in Manitoba) (see Tables 1 and 7).

In addition to Agriculture, the Trade,and the Transportation, Communication and Utilities divisions were relatively larger in Manitoba than in Canada. In the first two divisions, Agriculture and Trade, the differences in relative sizes became less pronounced over time; in Transportation, Communication and Utilities the gap between provincial and national size appears to have remained relatively stable. Along with Manufacturing, the Construction and other Primary Industries divisions are relatively smaller in Manitoba than in Canada. In Manufacturing this gap appears to have narrowed somewhat; in Construction the gap has remained relatively stable with a slight narrowing tendency while in the Other Primary Industries division the gap has widened marginally. Services, the largest and fastest growing sector, has increased its share in both Manitoba and Canada proportionately and has thus remained of approximately equal importance in both economies (see Table 1 and 7).

Examination of other provincial economies to determine their degree of similarity with the structure of the Canadian economy is a useful exercise; more important is the examination of the existence of a tendency for provincial

TABLE 7

M A N I T O B A

INDUSTRY STRUCTURE AT THE DIVISION LEVEL, 1966-1974

(EMPLOYMENT)

DIVISION	EMPLOYMENT			RELATIVE SIZE IN MANITOBA						GROWTH					
	1966	1970	1974	1966 %	RANK	1970 %	RANK	1974 %	RANK	1966-74 %	RANK	1966-70 %	RANK	1970-74 %	RANK
Service	112	130	159	32.4	1	35.8	1	38.7	1	41.9	1	16.1	1	22.3	1
Fin. Ins., and Real Estate	15	15	20	4.3		4.1		4.9		33.3		0		33.3	
Comm. Bus. & Personal	76	93	110	22.0		25.6		26.7		44.7		22.4		18.3	
Public Admin.	21	22	29	6.1		6.1		7.1		38.1		4.8		31.8	
Manufacturing	55	53	60	15.9	3	14.6	3	14.6	3	9.1	5	-3.6	5	13.2	2
Trade	64	66	74	18.5	2	18.2	2	18.0	2	15.6	3	3.1	4	12.1	3
Trans., Com. and Utilities	40	45	48	11.6	5	12.4	5	11.7	4	20.0	2	12.5	2	6.7	5
Construction	19	20	22	5.5	6	5.5	6	5.4	6	15.8	4	5.3	3	10.0	4
Agriculture	52	45	42	15.0	4	12.4	4	10.2	5	-19.2	6	-13.5	6	-6.7	7
Other Primary	6	4	4	1.7	7	1.1	7	1.0	7	-33.3	7	-33.3	7	0	6
TOTAL	346	363	411	-	-	-	-	-	-	18.7		4.9		13.2	

Source: Derived from Labour Force Survey Data, obtained from Statistics Canada, Ottawa economies to become more similar to the Canadian economy in structure. If such a tendency were discovered it would lend credence to the assertion that in a maturing economy, natural resource advantages of any region have a declining influence on its industrial structure. One would then be more justified in searching for additional determinants of industrial structure.

When each provincial structure is compared to the Canadian structure for each of the years 1966, 1970 and 1974 by use of the specialization coefficient,* it appears that all provinces closely resemble the Canadian structure; in fact, the structural similarities are increasing over time. Between 1966 and 1974 all provinces, except Quebec (an already highly diversified province) and perhaps New Brunswick, demonstrated a tendency to become more similar to the Canadian structure and thus more like each other. The fact that the Service Sector is the largest and fastest growing division in every province no doubt accounts for much of this homogenizing trend in structure whereas the relatively large variations in relative size and growth for Manufacturing and Agriculture are the main stalwarts against this homogenizing trend (see Table 8).

If the structures of all regions are approximately the same and becoming more so over time, and if the thesis that there is a secular trend towards increasing concentration of economic activity in the Axis (southern parts of Ontario and Quebec) is correct, then we should observe increasing shares in all divisions in Ontario and Quebec and in the Axis; we should at least observe an increasing share in most divisions, especially the faster growing ones. Examination of Table Nine does not reveal any such trend. In fact, the combined share of Ontario and Quebec in every division in the years 1951, 1961, and 1971 has remained remarkably stable. The same is true for other regions in Canada. Where there are exceptions, such as Agriculture and Mining in the Prairies, and Forestry in British Columbia, they usually involve small and/or declining divisions; these divisions would have relatively little effect on the over-all structure of the economy. Although it was possible to obtain the appropriate data for the Axis only for the year 1961 and 1971, the same conclusions were apparent.

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* The Specialization Co-efficient is a measure of how closely one distribution resembles another. The values of the co-efficient range from zero (no differences in the two distributions) to an upper limit of one (no similarity at all in the two distributions).

TABLE 8

PROVINCIAL SPECIALIZATION COEFFICIENTS

Province	1966	1970	1974
British Columbia	0.082 (3)	0.090 (3)	0.073
Alberta	0.137	0.125	0.127
Saskatchewan	0.226 (4)	0.202 (4)	0.207 (5)
Manitoba	0.117 (5)	0.110 (5)	0.103 (5)
Ontario	0.066	0.057	0.048
Quebec	0.035	0.041	0.039
New Brunswick	0.099	0.091	0.105
Nova Scotia	0.103	0.096	0.083
Prince Edward Island	0.171 (1)	0.160 (6)	0.138 (7)
Newfoundland	0.110 (2)	0.088 (2)	0.109 (8)

(1) Reliability of data for primary industries, construction, transportation, communication and other utilities and services is low.

(2) Based on only 6 sectors; data on agriculture unavailable. Services data has low reliability.

(3) Reliability of data for agriculture is low

(4) Reliability of data for primary industries and services is low

(5) Reliability of data for primary industries is low

(6) Data for primary industries and services unavailable; reliability of data on construction and transportation, communication and other utilities is low.

(7) Based on only 6 sectors; data on services unavailable. Data on agriculture, primary industries, construction, manufacturing, transportation, communications and other utilities is low.

(8) Based on only 6 sectors; data on agriculture unavailable; reliability of data on primary industries and services is low

Source: Derived from Labour Force Survey Data, Statistics Canada, Ottawa.

TABLE 9

DIVISIONAL LABOUR FORCE DISTRIBUTION BY ECONOMIC REGION, 1951, 1961, 1971

DIVISION	ONT. & P. Q.			AXIS			MARITIMES			BRITISH COLUMBIA			PRAIRIES			MANITOBA		
	1951	1961	1971	1951	1961	1971	1951	1961	1971	1951	1961	1971	1951	1961	1971	1951	1961	1971
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Service	63.2	63.9	64.1	N A	58.4	57.2	10.1	9.4	8.4	9.8	9.8	10.7	17.0	16.9	16.9	5.6	5.2	4.8
i) Fin., Ins. & R. E.	69.9	70.2	68.8	N A	N A	N A	5.0	5.0	5.1	10.1	9.9	11.7	14.9	14.8	14.5	6.1	5.3	4.4
ii) Comm., Bus.& Per.	63.7	64.8	64.2	N A	N A	N A	9.4	8.2	7.9	9.6	9.8	11.1	17.3	17.2	16.9	5.4	5.1	4.6
iii) Public Admin.	58.6	58.5	60.9	N A	N A	N A	14.3	14.6	12.1	10.1	9.6	9.0	17.0	17.4	18.0	5.9	5.5	5.3
Manufacturing	78.5	79.0	77.4	N A	73.5	73.1	6.3	5.5	5.7	7.5	8.0	8.6	7.6	7.4	8.2	3.6	3.3	3.3
Trade	62.0	62.4	62.5	N A	55.8	55.2	9.9	9.1	8.4	9.9	10.0	11.6	18.1	18.5	17.4	6.7	5.8	5.1
Transp. Comm. & Utility	59.8	59.3	58.9	N A	50.1	51.0	11.2	10.8	10.0	9.8	10.4	13.0	19.2	19.5	18.3	7.1	6.6	6.0
Construction	65.6	65.2	60.6	N A	56.7	55.7	10.2	6.8	10.3	8.8	8.4	11.9	15.5	19.6	17.3	4.9	4.9	4.2
Agriculture	47.9	46.8	42.2	N A	40.3	39.6	8.1	5.5	4.3	3.3	3.6	4.8	40.7	44.1	48.7	8.9	9.3	9.8
Other Primary	44.4	50.3	42.2	N A	12.1	9.3	30.8	22.6	18.6	14.5	12.8	19.6	10.3	13.5	19.6	2.5	3.1	3.8
i) Forestry	52.5	55.6	40.9	N A	N A	N A	25.3	20.1	16.7	19.2	19.4	37.3	3.0	4.8	5.0	1.2	1.2	1.0
ii) Fish.& Trapping	14.7	15.1	13.2	N A	N A	N A	67.9	62.5	68.1	9.6	13.0	15.3	7.9	9.4	3.3	3.2	3.7	1.4
iii) Mines	48.7	57.2	48.2	N A	N A	N A	19.7	13.4	10.4	11.0	6.8	10.8	20.6	22.5	30.6	3.8	4.7	5.7
ALL ACTIVITY	64.8	64.3	64.0		56.3	57.5	9.7	8.7	8.1	8.1	8.9	10.5	17.4	17.9	17.1	5.4	5.3	4.8

SOURCE: 1) Provincial data derived from Statistics Canada, 1951 Census of Canada, Labour Force, Industry by Sex, #4-4, Vol. IV, Table 16.

Provincial data derived from Statistics Canada, 1961 Census of Canada, Labour Force, Industry by Sex, #94-522

Provincial data derived from Statistics Canada, 1971 Census of Canada, Labour Force, Industry by Sex, #94-736, Vol. III, Part 3

2) Axis data from M. Yeates, Main Street, Table 5.1, p.148

III Growth of the Manitoba Economy

From 1966 to 1973 total employment in Manitoba grew by 12.6%, significantly less than the Canadian average of 22.4% and lower than most of the provinces as well; it ranked eighth, ahead only of Nova Scotia (11.1%) and Saskatchewan (5.8%). Some insight in this relatively poor performance can be gained by use of the Shift-Share technique. This technique divides the difference between the provincial and the Canadian rates of growth (hereafter called net relative growth) into two components - the industry mix component and the competitive effects component. The industry mix indicates how much of the net relative growth is due to the structure of the industry within the province; the competitive effect is an indication of the amount of growth due to the average competitiveness of each division in each province. That is, the competitive effect reveals how well, on average, each division in the province competed with its counterparts in other provinces.

Manitoba's net relative growth was -9.8 percentage points (22.4% - 12.6%) for the period 1966 to 1973. This relatively poor performance was due, apparently, almost entirely to poor competitive performance. This is not surprising since the structure of the Manitoba economy was very similar to the Canadian structure and thus one would not expect the industry mix effect to be a large explanation for the net relative growth rate. In other words, if it were not for the competitive effect, Manitoba would have grown at approximately the same rate as Canada. In terms of employment, had the adverse competitive effect not existed, Manitoba would have increased its employment by an additional 29,000 jobs during this period. If Manitoba's structure had been identical to that of Canada as a whole, 4,000 additional jobs would have been created. These conclusions can be generalized for all provinces; the majority of the explanation for the net relative growth rate for each province is the competitive effect (see Table 10).

It is interesting to note that the three fastest growing provinces (B.C., Ontario and Alberta) had large positive competitive effects components and that the slower growing province all had large negative competitive effects components. These results imply that the fast growing provinces are growing relatively fast within each of the divisions and thus in the next time period will have a larger share of each division. The reverse is true for the slow growing provinces. The limited influence of the industry mix component implies that none of the provinces has a particularly disproportionately large share of the fast growing sectors within their boundaries. These conclusions are consistent with the earlier findings that all provinces have an industrial structure similar to the over-all Canadian structure.

Caution must be exercised in the interpretation of these findings. The competitive effect, by measuring the differential in growth rates between a division within a province and that same division at the national level, indicates only that the province in question is getting a larger or smaller share within the division in question. In other words, if a province is growing faster in a division than the average growth of that division in Canada, that province is acquiring a larger share of that division's employment. The reason for the increasing share may have nothing to do with the 'competitiveness' (in the sense of efficiency) of the firms. In fact, it is possible that the share of employment in a province is increasing because the firms in that province are inefficient. Clearly then, the relative importance of the competitive effects component of net relative growth can only serve as a guide for further investigation. Thus, all that can be said at this point is that the reasons for differing growth rates among provinces appear to be factors which influence relative growth within divisions rather than those which influence industrial composition of the provinces.

The second reason for taking care when interpreting shift share results is that the two effects (industry mix and competitive effects) are averages of all division within a province. Within Manitoba the industry mix and competitive effects component for each of the divisions are not similar to the average results for the province. In fact, in Manitoba there is considerable variation at the division level. Considering Manitoba as whole, +87.9% of the difference between the provincial growth rate and the Canadian growth rate (net relative growth) was due to the competitive effect. Yet in the Service sector, the competitive component was only -11.7% (see Tables 10 and 11). In other words, not only did the competitive effect in this division not contribute to growth, it actually retarded potential growth.

TABLE 10

SHIFT SHARE ANALYSIS BY PROVINCE
1966 - 1974

	Province	(a) Growth Rate %	(b) Net Relative Growth Rate (Canada % - Prov. %)	(c) Industry Mix Component % of (b)	(d) Competiti Componen % of (b
1	British Columbia	38.4	16.0	+12.9	+87.9
2	Ontario	27.0	4.6	+ 6.7	+93.3
3	Alberta	25.5	3.1	-64.7	+164.7
4	Newfoundland	23.6	1.2	N A	N A
5	Quebec	16.6	- 5.8	+ 7.8	-107.8
6	New Brunswick	14.7	- 7.7	+33.3	-133.3
7	Prince Edward Is.	14.7	- 7.7	N A	N A
8	Manitoba	12.6	- 9.8	-12.1	- 87.9
9	Nova Scotia	11.1	-11.3	+ 7.4	-107.4
10	Saskatchewan	5.8	-16.6	-35.9	- 64.1
	Canada	22.4	-	-	-

a) Growth Rate = $E_{1973} - E_{1966} / E_{1966}$

b) Net Relative Growth Rate = Provincial Growth Rate - Canadian Growth Rate

= $\Delta Eij/Eij - \Delta E/E$

c) Industry Mix = $\Sigma\ Eij\ (\Delta Ei/Ei - \Delta E/E)$

d) Competitive Component = $\Sigma\ Eij\ (\Delta Eij/Eij - \Delta Ei/Ei)$

where:

Ei = employment in industry i at the national level

Eij = employment in industry i in province j

E = total employment at the national level

Ej = total employment in province j

Source: Derived from Shift Share analysis, EDAB, 1975

TABLE 11

SHIFT SHARE ANALYSIS, MANITOBA, 1966-1973

			Shift Share Analysis			
Sector	Relative Size 1973	Growth 1966 - 1973	Net Relative Growth	Net Relative Growth	Industry Mix	Competitive Effect
	(%)	(%)	(Percentage Points)	(Absolute)		
Service	39.9	37.5	+15.1	+17,000	+19,000 (+111.7%)	-2,000 (-11.7%)
Trade	18.4	12.5	- 9.9	- 6,000	+ 3,000 (+ 50.0%)	-9,000 (-150.0%)
Manufacturing	15.1	7.3	-15.1	- 8,000	- 5,000 (-62.5%)	-3,000 (-37.5%)
Transp., Comm. & Utilities	11.5	12.5	- 9.9	- 4,000	+ 1,000 (+25.0%)	-5,000 (-125.0%)
Agriculture	9.4	-28.8	-51.2	-27,000	-19,000 (-70.4%)	-8,000 (-29.6%)
Construction	5.4	10.5	-11.9	- 2,000	- 2,000 (-100.0%)	0 (0%)
Other Primary	1.0	-33.3	-55.7	- 3,000	- 1,000 (-33.3%)	-2,000 (-66.7%)
Total	100.0%	12.6%	- 9.8	-33,000	- 4,000	-29,000

Source: EDAB Shift Share Analysis, 1975.

The Service sector in Manitoba grew 15.1 percentage points in excess of the Canadian growth rate and created 17,000 more jobs than it would have had it grown at the over-all Canadian rate; however, had a negative competitive effects component not been present, 19,000 jobs rather than 17,000 jobs would have been created. In other words 2,000 potential jobs in the Manitoba Service sector were lost because this sector was not competitive; that is, the Manitoba Service sector grew at a slower rate than the Canadian Service sector. The industry mix effect accounted for 111.7% of the net relative growth rate and the competitive effect created a drag of 11.7% on the growth of the Service sector in Manitoba (see Table 11).

Several other observations can be made from Table 11. First, the growth rate for every division in the province, except for Services, was below the national average growth rate (i.e. net relative growth rates are negative). Thus it would appear that blame for Manitoba's relatively poor growth performance cannot be assigned to any one division. Second, the province performed particularly badly in the Trade and the Transportation, Communications and Utilities Divisions. At the national level these two divisions were growing faster than the Canadian economy as a whole. If these divisions within Manitoba had expanded at their national rate of growth, 3,000 more jobs in Trade and 1,000 more jobs in Transportation, Communications and Utilities would have resulted. However, because of poor competitive performance, the actual number of jobs created were 6,000 and 4,000 less than the number which would have resulted if the Trade and Transportation,communications and Utilities Sectors respectively in Manitoba had been growing at the rate of the Canadian economy as a whole. Third, despite the apparently poor performance in Agriculture, Manitoba may have performed relatively well; 70.4% of the decline in net relative growth stemmed from the industry mix effect. The bulk of the decline in the Manitoba Agricultural sector was a result of forces not unique to Manitoba. The remaining 29.6% of the decline in net relative growth was due to the slower rate of growth of Agriculture in Manitoba than on the national level. If Agriculture is a declining sector in terms of employment, the fact that Manitoba's Agricultural division declined more quickly than elsewhere could indicate that Manitoba is 'competitive' in Agriculture. The same observations apply to the other Primary Industries and Manufacturing sectors. Such conclusions are very tentative but do indicate that several existing Provincial Government policies such as the Stay Option and policies to promote manufacturing activities are contrary to current trends. If such policies are to be pursued then the forces influencing the existing trends must be identified.

These comments about Manitoba's growth performance must be put in perspective. First, the growth rate of a division within a province when divided by the over-all growth rate of that province produces a ratio (referred to as the 'k' ratio) which is approximately similar for the same divisions in other provinces. This means that a division that is growing relatively quickly in fast growth provinces is also growing relatively fast in the slow growth provinces; conversely a division that is growing relatively slowly in a fast growth province is also growing relatively slowly in a slow growth province. This implies that the factors influencing growth in one area also influence growth elsewhere; it also appears that differences in provincial growth rates are not due to differences in performance by any one division in a particular province. In other words, it appears that the factors which resulted in Manitoba's poor growth performance were factors which influenced all sectors of the Manitoba economy and not just one sector.

It is also interesting to note that when 'k' ratio for a division within a province differs from the 'k' ratio for that division at the national level, the sign of the provincial 'k' ratio is usually the opposite of the sign of the difference between the relative size of that division at the provincial level and the national level. For instance, if the provincial 'k' ratio is larger than the national 'k' ratio, that division is usually relatively smaller in that province than it is in the nation as a whole. This finding reinforces the findings based on the observation of the trends in the specialization co-efficients, namely that the provinces are becoming more alike in structure over time (see Table 12).

TABLE 12 PROVINCIAL "k" RATIOS, 1966

PROVINCE		SERVICES		MANUFACTURE		TRADE		TRANSP. COMM. & UTILITIES		CONSTRUCTION		AGRICULTURE		OTHER PRIMARY	
		$\frac{\Delta Eij/Eij}{\Delta Ej/Ej}$ "k"	$\frac{Eij}{Ej}$ 1966	$\frac{\Delta Eij/Eij}{\Delta Ej/Ej}$ "k"	$\frac{Eij}{Ej}$ 1966	$\frac{\Delta Eij/Eij}{\Delta Ej/Ej}$ "k"	$\frac{Eij}{Ej}$ 1966	$\frac{\Delta Eij/Eij}{\Delta Ej/Ej}$ "k"	$\frac{Eij}{Ej}$ 1966	$\frac{\Delta Eij/Eij}{\Delta Ej/Ej}$ "k"	$\frac{Eij}{Ej}$ 1966	$\frac{\Delta Eij/Eij}{\Delta Ej/Ej}$ "k"	$\frac{Eij}{Ej}$ 1966	$\frac{\Delta Eij/Eij}{\Delta Ej/Ej}$ "k"	$\frac{Eij}{Ej}$ 1966
1	British Columbia	1.20	35.0%	0.75	20.1%	1.0	18.9%	1.38	9.9%	0.82	8.0%	-1.42	3.7%	1.22	4.4%
2	Alberta	1.57	33.7	0.66	10.7	0.98	18.2	0.77	9.3	0.86	7.5	-1.04	17.1	2.68	3.5
3	Saskatchewan	3.66	30.5	4.79	5.5	1.52	17.5	-2.20	8.9	-5.53	5.8	-2.28	28.9	3.83	2.8
4	Manitoba	2.98	32.2	0.58	15.8	0.99	18.4	0.99	11.5	0.83	5.5	-3.29	14.9	-3.64	1.7
5	Ontario	1.74	32.2	0.46	31.2	1.20	15.7	1.20	7.3	0.70	6.6	-1.48	5.3	0.07	1.9
6	Quebec	2.10	32.7	0.53	27.8	1.29	15.6	1.29	8.5	-1.50	7.1	-2.10	5.3	-2.38	3.0
7	New Brunswick	1.91	33.7	0.66	16.3	1.60	17.9	0.59	12.1	0.46	7.9	-3.48	5.8	0.0	6.3
8	Nova Scotia	1.86	34.9	0.93	16.6	2.54	16.6	-1.33	11.5	-2.59	7.2	- 4.0	5.1	-2.90	8.1
9	Prince Edward Is.	3.40	29.4	....	....	....	17.6	....	....	....	....	....	23.5	....	5.9
10	Newfoundland	1.76	32.3	1.25	13.4	1.59	18.9	1.33	12.6	0.30	11.0	....	....	....	....
11	Canada	1.77	32.8	0.57	24.4	1.20	16.5	1.10	8.7	0.44	7.0	-1.63	7.6	0.08	3.1

Research Paper #2

"Trends in Industrial Location"

By
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Spring 1976

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A) INTRODUCTION

I Purpose

There are certain 'key' industries which can be identified as more important than others to the process of growth and development. The key manufacturing industries shall be referred to, collectively, as the core, or to use Averitt's terminology, the 'centre economy' (R. Averitt, The Dual Economy, pp. 38-43). If the heartland-hinterland thesis is correct we would expect the centre economy to be more geographically concentrated than the peripheral economy in the heartland of Canada, namely the southern parts of Ontario and Quebec; this geographic region has been referred to by M. Yeates as the 'Axis' (Main Street, pp. 4-7). We would also expect the geographic concentration of the centre economy in the Axis to increase over time.

The objectives of this paper are:

i) to determine the extent to which the key industries have gravitated towards the Axis; and
ii) to identify some possible reasons for the increasing geographic concentration.

In order to pursue these objective the key industries must be identified; the next section, Part B, will do just that. In part C the extent of geographic concentration of the key industries or centre economy will be analyzed empirically. Finally, in Part D, two possible explanations for the level and trends in geographic concentration will be examined.

II Findings

1. The empirical results of this paper must be highly qualified due to an inadequate data base. The bulk of the data problem stems from confidentiality requirements. However, some of the required data is either in existence but not published or available in a form not appropriate for our purposes.

2. According to the classification system used by Statistics Canada for the Input-Output Table (I.O.T.) of 1961, there are 97 industries in manufacturing. In the 1960 version of the Standard Industrial Classification (SIC) there are 139 manufacturing industries at the so-called three-digit level.

3. High Forward Linkages to all Divisions (see Table One)

i) Of the 97 I.O.T. industries, 26 supplied more than the average of the inter-industry intermediate manufacturing shipments to all divisions of the economy; these 26 industries included 39 S.I.C. industries and accounted for 69.0% of all intermediate manufacturing shipments to all divisions.

ii) The first 10 I.O.T. industries included 19 S.I.C. industries and accounted for 40.5% of all intermediate manufacturing shipments.

iii) The first 20 I.O.T. industries included 30 S.I.C. industries and accounted for 60.5% of all intermediate manufacturing shipments to all divisions.

4. High Forward Linkages Within Manufacturing (see Table Two)

i) Of the 97 I.O.T. industries, 25 supplied more than the average of the inter-industry intermediate manufacturing shipments to the manufacturing sector; these 25 I.O.T. included 34 S.I.C. industries and accounted for 78.8% of all inter-industry shipments within manufacturing.

ii) The first 10 I.O.T. industries included 14 S.I.C. industries and accounted for 51.5% of all inter-industry shipments within manufacturing.

iii) The first 20 I.O.T. industries included 29 S.I.C. industries and accounted for 72.4% of all inter-industry shipments within manufacturing.

5. High Backward Linkages to all Divisions (see Table Three)

i) Of the 97 I.O.T. industries, 25 accounted for more than the average purchase of the manufacturing industries from all the divisions; these 25 included 42 S.I.C. industries and accounted for 67.5% of all the manufacturing sector's purchases from all divisions.

ii) The first 10 I.O.T. industries included 19 S.I.C. industries and accounted for 44.8% of all the manufacturing sector's purchases from all divisions.

iii) The first 20 I.O.T. industries included 30 S.I.C. industries and accounted for 61.3% of all the manufacturing sectors purchases.

6. High Backward Linkages Within Manufacturing (see Table Four)

i) Of the 97 I.O.T. Industries, 27 accounted for more than the average purchase of manufacturing industries from other manufacturing industries; these 27 included 41 S.I.C. industries and accounted for 65.0% of all the manufacturing sector's purchases from manufacturing.

ii) The first 10 I.O.T. industries included 21 S.I.C. industries and accounted for 36.5% of all the manufacturing sector's purchases from itself.

iii) The first 20 I.O.T. industries included 34 S.I.C. industries and accounted for 55.4% of all the manufacturing sector's purchases from itself.

7. High Forward and Backward Linkages of Manufacturing Industries to all Divisions (see Table Five)

i) Of the 97 I.O.T. industries, 16 accounted for more than the average of the shipments to and purchases from all divisions within the economy; these 16 industries included 26 S.I.C. industires and accounted for 52.4% of all the manufacturing sector's forward linkages of intermediate products and 47.2% of all backward linkages.

8. High Forward and Backward Linkages Within Manufacturing (see Table Six)

i) Of the 97 I.O.T. industries 14 accounted for more than the average amount of shipments to other manufacturing industries and more than the average of the purchases from other manufacturing industries, these 14 I.O.T. industries included 20 S.I.C. industries and accounted for 57.6% of the forward linkages and 33.9% of the backward linkages within manufacturing.

ii) The first 10 of these I.O.T. industries included 16 S.I.C. industries and accounted for 50.5% and 25.8% of the forward and backward linkages respectively.

9. According to one method of industrial classification by Statistics Canada for the purpose of analyzing research and development expenditures, of the eight groups, six could be considered manufacturing industries. The six manufacturing groups accounted for the lion's share of all research and development. For instance in 1963 and 1973, these six groups accounted for 94% and 87% of all current intramural research* and development expenditures respectively (see Table Seven).

10. Within the manufacturing group, three broadly defined industries were consistently the most important in terms of dollars spent. These were Electrical Products, Chemically Based Products, and Machinery and Transportation Equipment (see Table Seven).

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* Current refers to operating as opposed to capital expenditures; intramural refers to all expenditures made by the private sector without regard to the source of financing.

11. When the industries were classified into 23 groups, 12 of them (less than half) accounted for approximately 90% of all current intramural research and development expenditures for the years investigated. The two largest groups by far were the Electrical Products Industries (comprised of 8 S.I.C. industries) and the Aircraft and Aircraft Parts Industry (comprised of 1 S.I.C. industry). However, especially in 1967, the Other Chemical Products Grouping (comprised of 8 S.I.C. industries) was quite large too (see Table Eight).

12. Of the 139 S.I.C. industries, 54 grew in percentage terms faster than the national average manufacturing employment growth rate between the years 1961 and 1969. However, due to confidentiality constraints, several of these 54 industries have only estimated growth rates (see Table Nine).

13. Of the 139 S.I.C. industries, 62 grew in percentage terms faster than the national average manufacturing value added growth rate between the years 1961 and 1969 (see Table Ten).

14. Of the 139 S.I.C. industries, 46 increased the absolute size of their labour by more than the mean average absolute increase in employment in manufacturing industries during the period from 1961 to 1969.

15. Of the 139 S.I.C. industries, 41 increased the absolute size of their value added by more than the mean average absolute growth in value added for the manufacturing industries during the period from 1961 to 1969 (see Table Twelve).

16. The level of manufacturing activity as measured by employment was highly concentrated in Ontario and Quebec particularly in the southern portions referred as the Axis. From at least 1952, Ontario and Quebec accounted for approximately 81% of all manufacturing employment (see Table One, Paper #3) whereas they accounted for only 63.7% of Canada's population in 1971. According to the Labour Force Survey, Ontario and Quebec accounted for 77.4% of the nation's manufacturing labour force in 1971 and the Axis accounted for 73.1%. Employment statistics were derived from Census of Manufacturing data; the differences in percentages as derived from the Census data and the Labour Force data are in part due to differences in definition - labour force as opposed to employment - but also no doubt to errors in measurement.

17. However, the average geographic distribution of key industries, identified by the 'Dependence Criterion', was no more concentrated than the non-key industries in the years 1961 and 1971.

18. Similarily, the average incidence of concentration of the key industries in Ontario and Quebec was no higher than the average incidence of the non-key industries.

19. During the years 1961 to 1971, there was nc large change in the average level of geographic concentration either for the key industry group or for the non-key industry group. However, both the Pietra ratios and the concentration ratios (for Ontario and Quebec) tended to decline somewhat. In other words, manufacturing in general was becoming somewhat less concentrated.

20. The differences in the changes in the level of concentration on average between the key and non-key industry groups were statistically insignificant for all tests on the 1961 and 1971 data.

21. There appears to have been no correlation between the geographic mobility and the growth rates of industries during the years 1961 and 1971.

22. There appears to have been a correlation (Spearman Rank Correlation) between growth and key industries (as identified by the Dependence Criterion. Therefore, the key industries tended to be the employment growth industries.

23. Economies to scale, whether internal or external to the plant could be a major explanation for the high incidence of geographic concentration in southern Ontario and Quebec. However, there is no readily available data to test these hypotheses.

III Summary and Implications for Policy

The results of the empirical work tend to refute our primary thesis, namely that there exists a dual economy composed of the centre (the key industries) and the periphery (the non-key industries), and that the centre economy is concentrated in the heartland of Canada (Ontario and Quebec) while the peripheral economy is dispersed throughout the country. In other words, our thesis was that the dual economy theory could provide an additional rationale for the heartland-hinterland thesis. In order to substantiate such a thesis, the empirical evidence should have shown a clear demarcation in the level and incidence of geographic concentration between key and non-key industries.

While the research does not substantiate our primary thesis it does not refute either the heartland-hinterland thesis or the dual economy thesis individually. First, it is clear that in terms of employment, manufacturing activity is geographically concentrated in the heartland of Canada - the area we have referred to as the Axis. Approximately 80% of all manufacturing employment is in Ontario and Quebec compared to 64% of Canada's population (1971). The lion's share of this 80% is in the Axis area. (Approximately 94% of all manufacturing employment in 1971 in Ontario and Quebec was in the Axis area.) Also our research has shown that this concentration of activity has been relatively stable over time with only a modest trend towards a smaller share during the 1961 to 1971 period. This last fact is both good news and bad news.

It implies that if the underlying dynamic forces do not change in character the heartland will not become relatively larger - the good news. It also implies that if Manitoba wishes to increase its relative size in manufacturing (at the expense of central Canada) it must take positive steps to alter existing forces; in other words, Manitoba's task is to alter, not simply strengthen, basic economic forces. It is always more difficult to run counter to the stream than to flow with it - that's the bad news. It should be noted parenthetically that the results of the shift-share analysis at the Division level (Paper #1) and the Manufacturing Group Level (Paper #3) indicated that the manufacturing sector relative to other divisions is declining in relative size at the national level.

Second, there appears to be no significant difference in the level, incidence or rate of change in the geographic concentration between the key and non-key industries. Therefore, if a dual economy exists this research indicates that the centre economy cannot be separated geographically from the peripheral economy.

This last finding has important implications. It implies that Manitoba, as part of the hinterland, cannot develop its manufacturing sector soley by promoting growth in non-key industries. Manitoba must promote the growth of key industries within its borders and the peripheral industries should develop as natural spin-offs. Such an implication is not startling. However, as a principle in policy formation, it can be easily violated. Key industries tend to have large plants in terms of employment and capital; they tend to be mature in organization in the sense that they have a few large firms which dominate the market and they tend to have stable and highly organized systems of marketing. Hence, for all these reasons the key industries tend to have high entrance barriers. Therefore, it is all too easy for a provincial government to shy away from promoting the establishment and growth of these industries within its borders in preference to the non-key industries with lower entrance barriers.

The selection of the key industries that should be developed in Manitoba requires more research. A first stage or preliminary method to identify key industries which show good potential for Manitoba has been presented in Paper #3. The method is essentially a screening of the industries in terms of size, growth, number of linkages, nature and scope of the product market and shift-share analysis. During the course of our research, we observed some evidence that clusters of industries exist in the sense that the industries any one cluster are strongly linked (forward and backward) to each other rather than one centre or core economy and one peripheral economy as was implied in our modification to Averitt's Dual Economy thesis. (Robert T. Averitt, The Dual Economy, (New York: W. W. Norton and Company, 1968. Also see fuller discussion of the thesis in Paper #1.) The identification of such clusters would be a fruitful area of research. A second stage of research, individual industry case studies would then be required. Such research would be costly in terms of time and money. It would require the use of a computor, a rather complicated economic techniques and preferably a better data base than the 1961 Input-Output Table of the Canadian Economy. See for instance, Stan Czamanski, Study of Clustering of Industries, (Halifax: Institute of Public Affairs, 1974) and Input/Output Study for Industrial Linkage Requirements, Background Paper #11, The North Pickering Project, Toronto: Government of Ontario, January, 1975).

In this paper, a considerable amount of work has been done to identify the key industries. They were identified by the Dependence Criterion (forward and backward linkages of intermediate demand with all sectors of the economy and just to manufacturing industries), the Research and Development Expenditure

Criterion, and the Growth (both absoluts and relative) Criterion.

However, for the analysis in Part C (Geographic Trends) and Part D (Factors Influencing Concentration) only the Dependence Criterion was used. In particular, the key industries were identified as those industries which had a higher than normal amount of forward and backward linkages. The analysis indicate that there was no difference in the amount of geographic concentration, the incidence of geographic concentration or the rate of geographic change between the group of key industries and the group of non-key industries. Also the rate of inter-provincial mobility of an industry did not appear to be associated with its rate of national growth. However, there was a positive correlation between key industries and relative growth rates of industries; key industries tend to grow faster than non-key industries.

The comments in this summary have all been based upon the results of these findings. Some qualifications now have to be made. First, the change in the size of employment as a measure of growth tends to favour the growth of some industries over others. Second, the selection of the years 1961 to 1971 to measure the change in employment will have caught the industries in different phases of their growth cycles and therefore distort somewhat the average yearly growth rate. Third, confidentiality constraints in the Statistics Canada data meant that some industries could not be used in our sample; their inclusion may have altered the results. Fourth, the data used to measure linkages were old;they came from an Input-Output Table for 1961. Fifth, the technique used to identify the core or centre economy was not rigorous. Instead of identifying that group of industries which are, according to the theory, highly linked or interdependent, the key industries were selected on the basis of whether or not they shipped or received a fairly large portion of the goods classified to intermediate demand.* The single most glaring fault with this technique is the fact that intermediate goods do not include fixed capital formation which was classified to the final demand category in the Input-Output Tables by Statistics Canada. Intermediate goods are essentially material supplies or circulating capital in economic terminology.

Finally, even if the data used represents reality accurately and despite the results of our analysis indicating the opposite, it is still possible that our primary thesis - the marriage of the heartland - hinterland thesis to the dual economy thesis - is correct. It is quite possible that the duality is an intra-industry phenomenon. That is, within industries, especially the key industries, key firms and/or plants and non-key firms and/or plants may exist. The key firms or plants are pivotal to the production process; they may be the producers of a strategic and important component of the product or they may be the final assembly point to which all component parts flow. Such a form of industrial organization would be consistent with our primary thesis. To test such a reformulation of our thesis would require intensive industry by industry analysis. (This reformation of the dual economy thesis is closer to Averitt's thesis. He argues that the centre economy is made up of key firms. A key industry would tend to have but need not necessarily have key firms. The opposite is also possible.) Also, it is possible that a reclassification of the industries into primary (resource based) or secondary (market or foot-loose) industries would alter the nature of our results. Finally, due to the fact that Quebec is declining in relative importance over time, defining Ontario only as the heartland may yield some interesting results.

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* A more sophisticated technique using input-output analysis, allows one to trace the total impact (direct and indirect) of an autonomous change in final demand. However, the technique requires time (including computer time) and money and for our purposes may not have been any more fruitful.

'Part B'

B) IDENTIFICATION OF KEY INDUSTRIES

I Theoretical Discussion

The eight guideposts that Averitt (pp. 38-43) uses to identify key industries are:

1. Technological Convergence

Due to the nature of products in certain industries, these industries act as catalysts" ... for the dissemination of rapidly advancing industrial know-how", and also" ... constitutes (sic) a pool of skill and technical knowledge employed throughout the manufacturing sector of the economy." Products of these industries have either one or both of the following two characteristics. First, the products are important inputs to a large number of other industries; therefore, use of these products as inputs by other industries greatly influences the nature of technology in the acquiring industries. Second, the techniques employed by technologically convergent industries are readily adaptable to many other industries. Based upon casual empiricism Averitt identifies the machine tool, the chemical and the electronics industries as the three industries which meet these criteria; he proposes no quantitative measure to identify the technological convergent industries.

2. Capital Goods

Averitt argues that the small number of industries which have a large proportion of their output assigned directly to the category of gross private fixed capital formation have, relative to their size, a disproportionately large influence upon the economy.

3. Industrial Interdependence

Industries which have many linkages, both forward and backward, will have important effects on the economy. "Linkages" is an economic term referring to the number of industries a particular industry sells its output to (forward linkages) and the number of industries a particular industry purchases its supplies from (backward linkages). Linkages may be strong or weak as well. For instance, if an industry supplies a large amount of another industry's input or if the input is of strategic importance and has few substitutes, then the linkage is strong.

4. Price-Cost Effect

Averitt argues that changes in the price of a certain few materials will greatly influence the cost structure of other industries. He cites steel and aluminum as examples of materials with price-cost effects.

5. Leading Growth Industries

Any industry which is growing faster than the national average will, by definition, have a positive effect on growth. However, within economics there is a vast literature on the subject of growth industreis that propounds that the actual importance of these industries is greater than their mathematical influence on average growth.

6. Major Research and Development Industries

To the extent that innovation is spawned from formal research, industries which account for a large proportion of research and development expenditures will be key industries.

7. Wage Setting Demonstration Effect

The wages set in certain industries tend to become the guidelines or benchmarks for a large number of other industries.

8. Full Employment Bottleneck Industries

During full employment or boom periods certain industries experience demand in excess of their production capacity levels to a degree that is greater than most industries. These bottlenecks greatly constrain the ability of the economy to grow and serve to generate inflationary pressure. These industries, Averitt argues, can be identified by examining relative increases in commodity prices.

The guidelines suggested by Averitt present us with several problems. First, his purpose in identifying key industries is much broader in scope than is our concern. Thus,. some of the guidelines are inapplicable for our research. Second, for several of the guidelines he makes no suggestions for identifying the industries except by 'casual empiricalism'. Third, when an attempt is made to devise objective quantitative measures for these guidelines, several guidelines merge together.

The purpose of our analysis is to identify those industries which constitute the heart or core of manufacturing activity in order to investigate the extent to which these industries are concentrating geographically and to discover the reasons behind the pattern of geographic concentration. If our thesis is correct, a small number of industries exist which not only account for the vast majority of all manufacturing output but whose activities are highly interdependent; thus a slow-down in any one of the key industries will severely cripple all manufacturing activity.

For our purposes, the Industrial Interdependence guideline is the most crucial. The industries within the core will be alternatively major suppliers and customers to each other. There may be suppliers of and customers for the core industries outside the core but these industries will not account for a large share of the core's business. This does not imply that a major share of the output from some of the suppliers outside the core cannot go to the core industries, nor does it imply that the major suppliers of these non-core industries are not from within the core. Thus the only important leakage of output from the core industries will be final goods purchased by consumers (which include households and governments). In practical terms, it would seem that the manufacturing core could be identified by examining the input-output tables published by Statistics Canada to identify the inner circle of industries whose inputs and outputs are primarily distributed amongst themselves. However, it was necessary to settle for a 'second best' approach which will be explained in detail below (see p. 113).

On a priori grounds there are good reasons to believe that any key industry identified by Averitt's other guidelines will also be identified by the Industrial Interdependence guideline. Any industry in which a price rise causes a significant rise in costs of other industries or in which capacity constraints cause bottleneck crises in supply, must have a large number of importance linkages, directly or indirectly (that is, the industry either supplies an industry directly or indirectly by supplying the supplier of the industry). Thus, the Price-Cost Effect and the Full Employment Bottleneck Guidelines should become redundant for identification purposes. As well, capital goods industries should, by definition, be suppliers primarily to key industries, given the assumption that key industries tend to be more capital intensive than other industries and tend to account collectively for a large share of total manufacturing activity. Third, the industries which serve as the centre of converging technology will probably be the most active in the area of research and development and will probably have a great many linkages. Fourth, growth industries are usually described in the economic literature as important not only because they are growing quickly but also due to the fact that they have a large number of linkages and are usually establishing new poles for technological convergence, an argument consistent with Schumpeter's theory of growth. Finally, the important industries with respect to the Wage Settlement Demonstration Effect should be among the industries possessing strong linkages.

II Identification of Key Industries Using the Industrial Interdependence Criterion

The Industrial Interdependence criterion is an attempt to measure the degree to which industries depend upon any one industry as a major supplier or customer. An industry which is a major supplier or customer shall be deemed a key industry and part of the centre economy. Three measures to identify key industries by this criterion are:

i) industries with high forward linkages are key industries;
ii) industries with high backward linkages are key industries;
iii) industries with high forward and/or backward linkages are key industries. Simply defined, an industry with high forward linkages is a major supplier to other producers; an industry with high backward linkages is a major customer to other producers.

The Input-Output Table is a large matrix which lists products in rows and the purchasers of the products in columns; it is possible to identify the distribution of any product classification by reading along the appropriate row.* Total production can be divided into final demand and intermediate demand.

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* Actually, the publication entitled The Input-Output Structure of the Canadian Economy, 1961 has three matrices. The first matrix has 40 products (rows) and 16 industries (columns). The second matrix is larger and more disaggregated; it has 65 products and 65 industries. The third matrix, which is the one used in this analysis, has 197 products and 110 industries.

Intermediate demand is the demand for a product by producers as an input in their own production process. As inputs, the products could be viewed as fixed capital such as machinery or as circulating capital which is often referred to by businessmen as materials and supplies; lumber for the furniture industry is a good example of 'circulating capital'. Unfortunately, due to Statistics Canada's method of compiling the statistics in the Input-Output Table, fixed capital is defined as a final goods. Therefore, in our research we can only analyze the circulating component of intermediate demand-(see Research Paper #3, Table Twenty-one, Footnote). Intermediate demand is the category we are most interested in since we wish to discover the relationship between industries. Intermediate demand can be further divided into 'intermediate demand by the manufacturing sector' and 'intermediate demand by other sectors.' Finally, within the manufacturing sector, intermediate demand can be classified by individual industries.

The Input-Output Table cannot be used as presented in the Statistics Canada publication because the rows list products. Thus, analysis of the Table would identify key products and not key industries. Using information available from Statistics Canada, products were allocated to industries and a new matrix which listed supplying industries in the rows and acquiring industries in the columns was generated.

The analysis also required a more specific definition of high forward a backward linkages. The measurement of forward and backward linkages can become quite complex but for our purpose we define an industry with high forward linkages as any industry that supplies more than the mean average of intermediat demand (Average Intermediate Demand = Total Intermediate Demand/Total Number of Supplying Industries). We define an industry with high backward linkages as any industry that purchases more than the mean average of intermediate demand Finally, since a high proportion of the shipments from plants within an industry is generally to plants within the same industry, linkages will be calculated in terms of total intermediate demand excluding intra-industry shipments.

Tables One and Two list the high forward linkage industries. Table One identifies those manufacturing industries which are large suppliers to all sectors of the economy; Table Two identifies those manufacturing industries which are large suppliers to the manufacturing sector only. Tables Three and Four contain high backward linkage industries. Table Three identifies those manufacturing industries which are large purchasers from all sectors of the economy; Table Four identifies those manufacturing industries which are large purchasers from the manufacturing sector alone. Finally, Tables Five and Six list the industries with high forward and backward linkages from all sectors and from the manufacturing sector alone.

III Identification of 'Key' Industries Using the Criterion of Research and Development Expenditures

Since 1956, Statistics Canada has conducted an annual survey to discover the amount and distribution of private sector research and development expenditures in Canada. The survey excludes all firms primarily engaged in agriculture, forestry, trapping, publishing, trade, finance, insurance and real estate, and community, business and personal service industries (except for engineering and scientific services, and trade associations) on the grounds that these sectors are not likely to be involved in research and development expenditures. The survey is carried out on a major scale in each odd numbered year and on a smaller scale in the even numbered years. R & D expenditures for the even numbered years are estimated on the basis of the results of the smaller survey and the distribution of expenditures from the previous year's large survey. For this reason, the analysis of odd numbered years is more reliable as an indicator of R & D trends.

Statistics Canada has presented the results of its surveys at two levels of disaggregation that, for purposes of identification, we call the 'major group' level and the 'group' level. At the major group level, there are eight industries identified, six of which are manufacturing industries (see Table 7). The manufacturing industries account for the lion's share of current intramural research and development expenditures; current intramural research and development expenditures is defined to include all expenditures on R & D, excluding capital equipment,actually made by the reporting firm regardless of the source of financing. Manufacturing industries accounted for 94% and 87.2% of all current intramural R & D expenditures in 1963 and 1973 respectively. The Electrical Products Group, the Chemical Based Products Group and the Machinery and Transportation Equipment Group were consistently the top three in terms of R & D expenditure and collectively accounted for 71% to 78% of all such

TABLE ONE: HIGH FORWARD LINKAGE INDUSTRIES

PRODUCER'S SHARE OF TOTAL INTERMEDIATE
MANUFACTURING SUPPLY TO ALL
INDUSTRIES (EXCLUDING INTRA-INDUSTRY SHIPMENTS)

1961

INDUSTRY	SIC CODE	SHARE	NO. OF BUYERS
1. Petroleum and Coal Prod.	365,369	6.4	110
2. Iron and Steel Products	291	6.1	48
3. Printing and Publishing	286,287,288,289	4.8	20
4. Industrial and Other Chemicals	378,379	4.3	85
5. Motor Vehicle Parts	325	4.3	12
6. Machinery and Equipment	311,315	3.7	38
7. Pulp and Paper Mills	271	3.2	78
8. Other Metal Industries	307,308,309	2.7	38
9. Paper Box and Bag	273	2.5	89
10. Smelting and Refining	295	2.5	46
SUB TOTAL	18	40.5	-
11. Saw Mills	251	2.5	43
12. Metal Stamping, Etc.	304	2.4	67
13. Cotton Yarn and Cloth	183	2.2	50
14. Communication Equipment	335	2.0	20
15. Feed Mills	123	2.0	9
16. Concrete and Gypsum	345,347,348	1.9	5
17. Wire and Wire Products	305	1.8	49
18. Fabricated Structural Metal	302	1.8	33
19. Hardware and Cutlery	306	1.7	34
20. Synthetic Textiles	201	1.7	31
CUMMULATIVE SUB-TOTAL	30	60.5	-
21. Cement and Lime	341,343	1.7	14
22. Slaughtering and Meat Processing	101	1.7	30
23. Steel Pipe and Tube	292	1.4	21
24. Other Electrical Products	334,337,339	1.3	19
25. Manufacturing of Plastic Resins	373	1.2	59
26. Glass and Glass Products	356	1.2	44
TOTAL	39	69.0	-

SOURCE: Derived from: Statistics Canada, "The Input-Output Structure of the Canadian Economy, 1961", Vols. 1 & 11, #15-501, #15-502, Table 13.

TABLE TWO: HIGH FORWARD LINKAGE INDUSTRIES

PRODUCER'S SHARE OF TOTAL INTERMEDIATE
MANUFACTURING SUPPLY TO MANUFACTURING
INDUSTRIES (EXCLUDING INTRA-INDUSTRY
SHIPMENTS)
1961

INDUSTRY	SIC CODE	SHARE %	NO. OF BUYERS
1. Iron and Steel Mills	291	9.7	40
2. Motor Vehicle Parts	325	6.8	11
3. Industrial and Other Chemicals	378,379	6.3	68
4. Pulp and Paper Mills	271	5.2	70
5. Smelting and Refining	295	4.7	42
6. Publishing and Printing	286,287,288,289	4.7	14
7. Paper Box and Bag	273	3.9	80
8. Cotton Yarn and Cloth	183	3.7	43
9. Miscellaneous Food	139	3.4	22
10. Metal Stamping, Etc.	304	3.1	63
CUMMULATIVE SUB-TOTAL	14	51.5	-
11. Synthetic Textiles	201	2.9	27
12. Other Metal Industries	307,308,309	2.7	32
13. Petroleum and Coal Products	365,369	2.6	82
14. Manufacturers of Plastic Resins	373	2.2	54
15. Cement and Lime Manufacturers	341,343	2.2	8
16. Sawmills	251	2.1	33
17. Vegetables Oils and Fats	135	1.8	33
18. Communications Equipment	335	1.6	14
19. Glass and Glass Products	356	1.4	36
20. Wool Yarn and Cloth	193,197	1.4	17
CUMMULATIVE SUB-TOTAL	29	72.4	-
21. Wire and Wire Products	305	1.3	40
22. Aluminum Rolling, Etc.	296	1.3	30
23. Slaughtering and Meat Processing	101	1.3	24
24. Flour Mills	124	1.3	14
25. Copper and Alloy Rolling, Etc.	297	1.2	20
TOTAL	34	78.8	-

SOURCE: Derived from: Statistics Canada, "The Input-Output Structure of the Canadian Economy, 1961", Vols. I & II, #15-501, #15-502, Table 13

TABLE THREE: HIGH BACKWARD LINKAGE INDUSTRIES

MANUFACTURING INDUSTRIES' SHARE OF TOTAL INTERMEDIATE DEMAND (EXCLUDING INTRA-INDUSTRY SHIPMENTS)

1961

INDUSTRY	SIC CODE	SHARE
1. Smelting and Refining	295	7.2%
2. Petroleum and Coal Products	365,369	6.2
3. Meat Processors	101	6.1
4. Pulp and Paper Mills	271	5.5
5. Motor Vehicle Manufacturing	323	4.5
6. Dairy Factories	105	4.3
7. Clothing Ind.	243,244,245,246,247,248,249	3.2
8. Iron and Steel Mills	291	2.7
9. Sawmills	251	2.6
10. Printing and Publishing	286.287,288,289	2.5
CUMMULATIVE SUB-TOTAL	20	44.8
11. Other Chemical Industries	378,379	2.2
12. All Other Machinery and Equipment	311,315	2.1
13. Feed Mills	123	1.7
14. Miscellaneous Food	139	1.7
15. Fruit and Vegetable Canners	112	1.5
16. Paper Box and Bag	273	1.5
17. Metal Stamping, etc.	304	1.5
18. Communication Equipment	335	1.5
19. Bakeries	129	1.4
CUMMULATIVE SUB-TOTAL	31	61.3
20. Vehicle Parts Mfg.	325	1.4
21. Flour Mills	124	1.3
22. Other Metal Industries	307,308,309	1.3
23. Aircraft and Parts	321	1.2
24. Mfr. of Electrical Appliances	331,332	1.2
25. Other Electrical Products	334,337,339	1.2
TOTAL	42	67.5

SOURCE: Derived from: Statistics Canada, "The Input-Output Structure of the Canadian Economy, 1961", Vols. I & II, #15-501, #15-502, Table 13

TABLE FOUR: HIGH BACKWARD LINKAGE INDUSTRIES

MANUFACTURING INDUSTRIES' SHARE OF TOTAL INTERMEDIATE MANUFACTURING DEMAND (EXCLUDING INTRA-INDUSTRY SHIPMENTS)

1961

INDUSTRY	SIC CODE	SHARE
1. Motor Vehicle Manufacturers	323	7.3%
2. Clothing	243,244,245,246,247,248,249	4.9
3. Smelting and Refining	295	4.5
4. Printing and Publishing	286,287,288,289	3.2
5. All Other Machinery and Equipment	311,315	3.1
6. Meat Processors	101	3.1
7. Pulp and Paper Mills	271	2.9
8. Other Chemical Industries	378,379	2.5
9. Metal Stamping, Etc.	304	2.5
10. Paper Box and Bag	273	2.5
CUMMULATIVE SUB-TOTAL	21	36.5
11. Communication Equipment	335	2.2
12. Vehicle Parts	325	2.1
13. Other Electrical Products	334,337,339	1.9
14. Other Metal Fabrication	309	1.9
15. Iron and Steel Mills	291	1.9
16. Bakeries	129	1.9
17. Miscellaneous Foods	139	1.8
18. Aircraft and Parts	321	1.8
19. Manufacturers of Electrical Appliances	331,332	1.8
20. Fruit and Vegetable Canners	112	1.6
CUMMULATIVE SUB-TOTAL	34	55.4
21. Feed Mills	123	1.5
22. Dairy Factories	105	1.4
23. Tobacco Product Manufacturers	153	1.4
24. Synthetic Textile Mills	201	1.4
25. Wire and Wire Products	305	1.4
26. Fabricated Structural Metal	302	1.3
27. Steel Pipe and Tube	292	1.2
TOTAL	41	65.0

SOURCE: Derived from: Statistics Canada, "The Input-Output Structure of the Canadian Economy, 1961", Vols. I & II, #15-501, #15-502, Table 13

TABLE FIVE: HIGH FORWARD AND BACKWARD LINKAGE INDUSTRIES
LARGE SUPPLIERS AND PURCHASERS FROM ALL SECTORS
1961

INDUSTRY	SIC CODE	SHARES		NO. OF BUYERS
		FORWARD	BACKWARD	
1. Petroleum and Coal Products	365,369	6.4	6.2	110
2. Smelting and Refining	295	2.5	7.2	46
3. Iron and Steel Mills	291	6.1	2.7	48
4. Pulp and Paper Mills	271	3.2	5.5	78
5. Slaughtering and Meat Processing	101	1.7	6.1	30
6. Printing and Publishing	286,287,288, 289	4.8	2.5	20
7. Industrial and Other Chemicals	378,379	4.3	2.2	85
8. Machinery and Equipment	311,315	3.7	2.1	38
9. Motor Vehicle Parts	325	4.3	1.4	12
10. Sawmills	251	2.5	2.6	43
SUB-TOTAL	16	39.5	38.5	
11. Other Metal Industries	307,308,309	2.7	1.3	38
12. Paper Box and Bag	273	2.5	1.5	89
13. Metal Stamping, etc.	304	2.4	1.5	67
14. Feed Mills	123	2.0	1.7	9
15. Communication Equipment	335	2.0	1.5	20
16. Other Electrical Products	334,337,339	1.3	1.2	19
TOTAL	26	52.4	47.2	
High Forward - Excluded from Above				
Cotton Yarn and Cloth	183	2.2	0.7	50
High Backward - Excluded from Above				
Motor Vehicle Manufacturers	323	0.1	4.5	7
Dairy Factories	105	1.0	4.3	17
Clothing Industry	243,244,245,246,247,248,249	0.3	3.2	19

SOURCE: Derived from: Statistics Canada, "The Input-Output Structure of the Canadian Economy, 1961", Vols. I & II, #15-501, #15-502, Table 13

TABLE SIX: HIGH FORWARD AND BACKWARD LINKAGE INDUSTRIES
LARGE SUPPLIERS AND PURCHASERS WITHIN THE MANUFACTURING SECTOR
1961

INDUSTRY	SIC CODE	SHARES FORWARD	 BACKWARD	NO. OF BUYERS
1. Iron and Steel Mills	291	9.7	1.9	40
2. Smelting and Refining	295	4.7	4.5	42
3. Motor Vehicle Parts	325	6.8	2.1	11
4. Industrial and Other Chemicals	378,379	6.3	2.5	68
5. Pulp and Paper Mills	271	5.2	2.9	70
6. Publishing and Printing	286,287,288,289	4.7	3.2	14
7. Paper Box and Bag	273	3.9	2.5	80
8. Metal Stamping, etc.	304	3.1	2.5	63
9. Miscellaneous Food	139	3.4	1.8	22
10. Other Metal Industries	307,308,309	2.7	1.9	32
SUB-TOTAL	16	50.5	25.8	
11. Slaughtering and Meat Processors	101	1.3	3.1	24
12. Synthetic Textiles	201	2.9	1.4	27
13. Communications Equipment	335	1.6	2.2	14
14. Wire and Wire Products	305	1.3	1.4	40
TOTAL	20	57.6	33.9	
HIGH FORWARD - EXCLUDED FROM ABOVE				
Cotton Yarn and Cloth	183	3.7	1.1	43
Petroleum and Coal Products	365,369	2.6	0.9	82
Manufacturers of Plastics Resins	373	2.2	0.6	54
HIGH BACKWARD - EXCLUDED FROM ABOVE				
Motor Vehicle Manufacturers	323	-	7.3	5
Clothing Industry	243,244,245,246,247,248,249	0.6	4.9	13
All Other Machinery and Equip.	311,315	0.7	3.1	25

SOURCE: Derived from: Statistics Canada, "The Input-Output Structure of the Canadian Economy, 1961", Vols. I & II, # 15-501, #15-502, Table 13 expenditures in Canada and 81% to 83% of all such expenditures in the manufacturing sector.

At the group level, there are twenty-three industry classifications, nineteen of which are in manufacturing. This level of disaggregation is available only for the years 1956 to 1967. Since the relative size of R & D expenditures displays a high degree of stability for this period the assumption that the pattern has not greatly altered in recent years is not unrealistic.

The top two groups at this level of disaggregation for the period 1963 to 1967 were the Electrical Products Industries (excluding the Scientific and Professional Instrument Industry) and the Aircraft and Parts Industry; together these two groups accounted for over 40% of all annual current R & D expenditures (ranging from 42% of all R & D expenditures in 1963 and 1967 to 48% in 1965). The Electrical Products Industries include eight S.I.C. industries at the three digit level; the Aircraft and Part Industry is itself a three digit level S.I.C. industry. (For a list of the 23 groups and the three digit S.I.C. industries that comprise each of these groups see Appendix.)

Other Chemical Industries and the Paper Products Industries ranked third and fourth in terms of R & D expenditures. With the exception of 1967, the top four ranking groups accounted for over 60% of all current private R & D expenditures in Canada from 1956-67. The top twelve ranking groups out of the total of twenty-three accounted for over 90% of all current private R & D expenditures for every year except 1967 when their collective share fell to 88% (see Table Eight).

In conclusion, based upon the criterion of R & D expenditures at the group level, the industries in the following top twelve ranking groups of industries could be identified as key industries:

1. Manufacturers of Electrical Products (excluding Scientific and Professional Instruments)
2. Manufacturers of Aircraft and Parts
3. Manufacturers of Other Chemical Products
4. Manufacturers of Paper and Paper Products
5. Manufacturers of Petroleum and Coal Products
6. Manufacturers of Primary Non-ferrous Metals

TABLE SEVEN: CURRENT INTERMURAL R & D EXPENDITURE BY INDUSTRY - MAJOR GROUPS

	1963		1965		1967		1969		1971		1973	
	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank
Manufacturing	94.0		94.0		92.6		92.4		89.3		87.2	
Electrical Products	25.0	2	27.0	2	31.9	1	30.7	1	31.6	1	27.2	1
Chemical Based	25.0	2	22.0	3	24.6	2	25.2	2	23.0	2	20.5	3
Machinery and Trans. Equipment	26.0	1	29.0	1	19.7	3	21.1	3	17.3	3	23.2	2
Metals	9.0	4	8.0	4	7.9	4	8.6	4	10.0	4	9.9	4
Wood Based	7.0	5	6.0	5	6.8	5	5.7	5	5.2	6	4.6	7
Other Manufacturing	2.0	8	2.0	7	1.7	8	2.1	8	2.1	8	1.9	8
Mines, and Gas and Oil Wells	3.0	6	4.0	6	4.2	6	3.6	7	4.6	7	6.4	5
Other Industries	3.0	7	2.0	7	3.2	7	4.0	6	6.1	5	6.4	6
TOTAL - Millions of Dollars	$153.2		$236.8		$290.6		$342.9		$383.2		$435.8	

SOURCE: Derived from: Statistics Canada Publications

#13-203, "Industrial Research: Development Expenditures in Canada"

TABLE EIGHT: CURRENT INTRAMURAL R & D EXPENDITURES

TOP TWELVE INDUSTRIES - GROUP LEVEL

	1963		1965		1967	
RANK	NAME	%	NAME	%	NAME	%
1	Elec. Products	21.0	Elec. Products	24.0	Elec. Products	28.0
2	Aircraft & Parts	21.0	Airctaft & Parts	24.0	Aircraft & Parts	14.0
3	Other Chem. Ind.	12.0	Other Chem. Ind.	10.0	Other Chem. Ind.	11.0
4	Paper Products	7.0	Paper Products	6.0	Paper Products	6.0
5	Prim. Non-Ferr Mtl	6.0	Petroleum Products	5.0	Petroleum Products	6.0
6	Petroleum Products	5.0	Prim. Non-Ferr. Mtl.	5.0	Prim. Non-Ferr. Mtl.	5.0
7	Machinery	4.0	Machinery	4.0	Machinery	4.0
8	Scientific & Prof. Instr.	4.0	Mines	3.0	Mines	3.0
9	Drugs and Medicine	3.0	Scientific & Prof. Instr.	3.0	Drugs and Medicine	3.0
10	Mines	3.0	Drugs & Medicine	3.0	Scientific & Prof. Instr.	3.0
11	Food & Beverage	2.0	Prim. Ferr. Metals	2.0	Food and Beverage	3.0
12	Prim. Ferr. Metal	2.0	Food and Beverage	2.0	Prim. Ferr. Metals	2.0
	TOTAL	90.0	TOTAL	91.0	TOTAL	88.0

SOURCE: Derived from Statistics Canada Publications:

#13-203, "Industrial Research of Development Expenditures in Canada".

7. Manufacturers of Machinery
8. Mines
9. Scientific and Professional Instrument Manufacturers
10. Drugs and Medicines
11. Food and Beverage Industries
12. Manufacturers of Primary Ferrous Metals

The identification of key industries in this manner must be qualified. First, the number of three digit S.I.C. industries within each group varies from a low of one to a high of eighteen. Information on the distribution of R & D expenditures at the 3 digit S.I.C. level within each group is unobtainable and the assumption of proportional distribution is probably unrealistic. Thus, if data at a greater level of disaggregation were available, no doubt many three digit level industries could be dropped from the list of key industries. Second, one of the above-mentioned groups, mines, is not a manufacturing group and so deviates from our intention to study only manufacturing groups. Third, the choice of industries in the top twelve groups to be defined as key industries is somewhat arbitrary; the top four, eight or ten groups might be equally appropriate (see Diagram One).

IV Identification of Key Industries Based Upon the 'Growth' Criterion

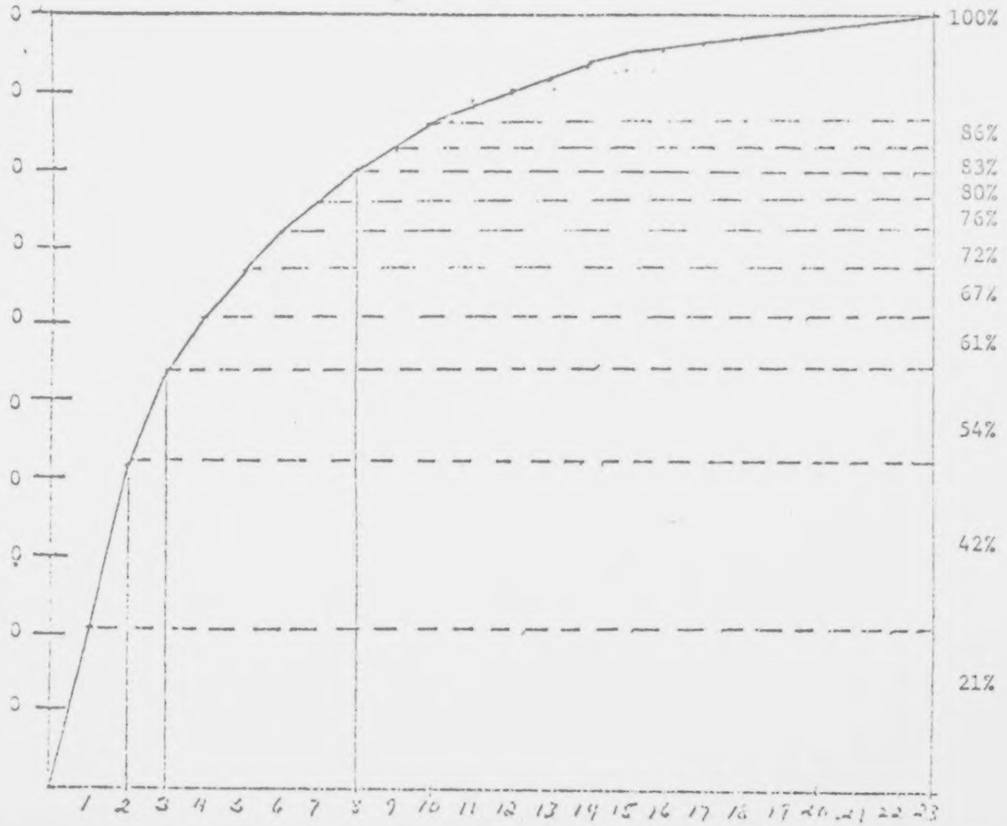
Employment in the industries listed in Table Nine grew at a faster rate than the average in the manufacturing sector from 1961 to 1969. Similarily, industries listed in Table Ten experienced growth in value added which exceeded that of national value added in manufacturing from 1961 to 1969. The designation of key industries based upon relative growth rates is somewhat arbitrary. The weakest definition would be to include all the industries in the two tables. However, depending upon the purpose, it may be better to designate only the top ten or twenty as key industries.

The use of growth rates alone does not allow the effects of industry size to be fully taken into account. Thus it is possible that a small and unimportant industry which grew quickly could be classified as a key industry. One solution is to weigh the growth rate by the size of the industry. Absolute growth in employment or value added yields such a weighted measure. Tables Eleven and Twelve list all the industries that grew more than average during

DIAGRAM ONE:

CONCENTRATION CURVE

CURRENT INTRAMURAL R & D EXPENDITURES, 1963



PERCENTAGE SHARE OF CURRENT INTRAMURAL R & D EXPENDITURES

Industry	%age	Cum. %age
1. Aircraft & Parts	21%	21%
2. Electrical Prod.	21	42
3. Other Chemicals	12	54
4. Paper	7	61
5. Primary Non-Ferr.	6	67
6. Petroleum	5	72
7. Machinery	4	76
8. Scientific Inst.	4	80
9. Drugs & Medicine	3	83
10. Mines	3	86
11. Food & Beverages	2	88
12. Primary Ferrous	2	90
13. Transp. & Utilit.	2	92
14. Textiles	2	94
15 to 23	6	100%

the 1961 to 1969 period for employment and value added respectively.

Due to confidentiality constraints, some of the growth rates had to be estimated on the basis of partial information. Thus the data should be interpreted with caution.

TABLE NINE: 3 DIGIT SIC CANADIAN INDUSTRIES WITH EMPLOYMENT GROWTH GREATER THAN NATIONAL AVERAGE, 1961 - 69

	INDUSTRY	GROWTH		INDUSTRY	GROWTH
①	Misc. vehicle mfgs.	896.3%	28	Steel pipe and tube	59.2%
2	Office: store machinery	308.1	29	Mfgs. misc. elec. prod.	59.0
3	Truck body and Trailer	200.7	㉚	Other non-metal mins.	55.3
④	Carpet, mat & rug industry	184.4	31	Mfg. elec. industrial eq.	55.0
5	Plastics fabricators n.e.s.	166.0	㉜	Textile dyeing and finish.	52.0
6	Motor vehicle parts	99.5	33	Other chemical industries	51.4
7	Communications equipment	99.2	㉞	Sporting goods and toys	47.8
⑧	Misc. machinery and equipment	97.6	35	Signs and displays	43.4
9	Scientific and prof. equipment	97.4	36	Misc. metal fabricating	43.1
⑩	Mfgs. toilet preparations	97.4	㊲	Misc. furniture	42.7
⑪	Motor vehicle mfgs.	93.4	㊳	Wire and wire products	41.8
12	Soft drink manufacturers	89.0	39	Iron foundries	41.7
⑬	Miscellaneous textile	85.3	40	Fish products	41.5
14	Ready-mix concrete mfgs.	84.5	41	Paint and varnish mfgs.	40.8
⑮	Commercial refrig. and air cond.	84.3	㊷	Soap and clean. comp.	40.6
16	Metal roll, cast & extrud.	82.4	43	Publishing only	40.2
17	Boat building and repair	81.8	㊹	Other rubber industries	38.0
18	Machine shops	78.3	45	Misc. food	37.9
⑲	Office furniture	76.0	46	Synthetic textile mills	37.2
20	Breweries	69.3	47	Wineries	36.5
21	Refractories mfg.	69.0	㊽	Mfgs. elec. wire and cable	35.0
22	Hardware, tool and cutlery	68.4	㊾	Battery mfgs.	34.5
㉓	Mfgs. phar. and medicine	66.3	50	Feed manufacturers	34.5
24	Boiler and plate works	66.1	(51)	Folding cartons and boxes	34.5
25	Metal stamp, press. and coating	63.9	52	Ornamental and arch. metal	34.5
㉖	Mfgs. small elec. appliances	60.9	53	Foundation garment	33.6
㉗	Misc. paper converters	59.7	54	Fab. structural metal	32.0
				Canadian average	30.1

SOURCE: EDAB Shift-Share analysis, Oct. 1975

Circled numbers designate those groups for which data were estimated.

TABLE TEN: 3 DIGIT SIC CANADIAN MANUFACTURING INDUSTRIES WITH VALUE ADDED GROWTH GREATER THAN NATIONAL AVERAGE, 1961-69

	INDUSTRY	GROWTH		INDUSTRY	GROWTH
①	Misc. vehicle mfgs.	1,921.2%	32	Textile dyeing and finish.	119.6%
②	Carpet, mat and rug	473.7	33	Mfgs. misc. elec. products	119.0
3	Plastics fabricators n.e.s.	452.9	㉞	Distilleries	115.7
4	Truck body and trailer	338.0	㉟	Mfgs. toilet preparations	114.7
5	Motor veh. pts.	278.2	36	Rubber tire and tube mfgs.	113.7
6	Boatbuilding and repair	241.4	㊲	Other non-met. mins.	111.9
⑦	Motor vehicle mfgs.	237.0	㊳	Misc.	109.0
⑧	Misc. textiles	223.4	39	Other knitting mills	108.7
9	Machine shops	216.7	㊵	Mfgs. pharm. and medicines	107.5
⑩	Office furniture	210.8	㊶	Mfgs. elec. wire and cable	107.2
11	Ready-mix concrete	207.3	㊷	Copper and alloy rod, cast & extrud.	106.9
⑫	Misc. mach. & equip. mfgs.	206.6			
⑬	Boiler and Plate works	191.6	43	Agricultural implements	104.6
14	Scientific and prof. equip. mfgs.	175.1	㊹	Misc. paper converters	104.5
15	Mineral wool mfgs.	161.6	㊺	Folding cartons and boxes	100.9
16	Shingle mills and sawmills	153.2	㊻	Mfgs. elec. industrial equip.	100.7
⑰	Comm. refrig. and air cond.	147.8	㊼	Sporting goods and toys	100.3
18	Metal roll, cast. and extrud.	146.9	48	Jewellery and silverware	98.9
⑲	Wooden box factories	144.7	49	Feed manufacturers	98.3
20	Communications equip. mfgs.	144.7	50	Miscellaneous wood	97.1
21	Alum. roll, cast and extruding	142.8	(51)	Gypsum prods. mfgs.	97.1
㉒	Explosives and ammunition	142.3	52	Household furniture	96.6
23	Fab. struc. metal	131.4	53	Fish products	96.4
㉔	Veneer and plywood mills	128.4	54	Misc. metal fabricating	96.2
25	Glass and glass prod. mfg.	127.4	(55)	Electric lamp and shade	95.4
26	Iron foundries	127.0	56	Synthetic textiles	95.3
27	Metal stamp. press and coat.	126.5	57	Concrete products mfg.	94.5
㉘	Mfgs. small elec. appliances	126.3	58	Wineries	91.6
29	Refractories mfg.	124.9	59	Signs and displays	91.6
㉚	Hardware, tool and cutlery	122.7	60	Misc. food industries	90.1
㉛	Wire and wire products	121.7	(61)	Other rubber industries	90.1
			62	Orn. and arch. metal	87.7
				Canadian average	87.2

SOURCE: EDAB Shift-Share Analysis, Oct. 1975

Circled numbers designate those groups for which data were estimated

TABLE ELEVEN 3 DIGIT SIC CANADIAN MANUFACTURING INDUSTRIES WITH ABSOLUTE EMPLOYMENT GROWTH GREATER THAN THE NATIONAL AVERAGE, 1961 - 69

	INDUSTRY	GROWTH		INDUSTRY	GROWTH
①	Misc. Mach. and equip. mfg.	25,975	24	Hardware, tool and cutlery	5,850
2	Communications equip. mfg.	24,368	25	Misc. paper converters	5,819
3	Motor vehicle parts	20,721	㉖	Aircraft and parts mfg.	5,788
④	Motor vehicle mfgs.	20,243	27	Fish products	5,617
5	Plastics fabricators n.e.s.	12,537	㉘	Misc. vehicle mfg.	5,387
6	Metal stamp. press and coat.	11,879	29	Misc. elec. products	5,376
7	Office and store mach.	10,573	㉚	Pharm. and medicines	5,043
8	Scientific and prof. equip.	10,021	㉛	Wire and wire prods.	5,019
⑨	Pulp and paper mills	9,628	32	Household furniture	4,775
⑩	Mfgs. elec. ind. equip.	9,021	33	Mfgs. industrial chems.	4,553
11	Shingle mills and sawmills	8,996	34	Misc. food industries	4,465
⑫	Iron and steel mills	8,408	35	Fabricated structural metal	4,414
13	Women's clothing industry	7,478	㊱	Smelting and refining	4,086
14	Poultry processors	7,225	㊲	Misc. furniture industry	3,912
15	Soft drink mfgs.	6,978	38	Ready-mix concrete	3,438
16	Truck body and trailer	6,760	39	Iron foundries	3,410
17	Commercial printing	6,549	㊵	Other knitting mills	3,336
18	Machine shops	6,373	41	Other chem. industries	3,296
19	Misc. metal fabricating	6,296	42	Orn. and arch. metal	3,279
20	Men's clothing industry	6,036	㊸	Carpet, mat. and rug	3,202
㉑	Folding cartons and boxes	6,016	㊹	Sporting goods and toys	2,997
22	Miscellaneous textile	5,997	㊺	Boiler and plate works	2,983
23	Synthetic textile mills	5,960	㊻	Other rubber industries	2,788
				Canadian average	2,735

SOURCE: EDAB Shift-Share Analysis, October 1975

Circled numbers designate those groups for which data were estimated

TABLE TWELVE:3 SIC CANADIAN MANUFACTURING INDUSTRIES WITH ABSOLUTE VALUE ADDED GROWTH GREATER THAN THE NATIONAL AVERAGE 1961-69

	INDUSTRY	GROWTH		INDUSTRY	GROWTH
①	Motor vehicle mfgs.	656,917	22	Dairy products	113,264
2	Motor vehicle pts. and acces.	447,270	23	Men's clothing	113,131
③	Misc. mach. & equip. mfg.	430,783	24	Misc. metal fabricating	113,021
④	Pulp and paper mills	416,991	㉕	Wire and wire products	111,617
⑤	Iron and steel mills	297,234	26	Machine shops	102,187
6	Communications equip. mfg.	236,245	27	Household furniture	100,680
7	Plastics fabricators n.e.s.	226,934	28	Rubbertire and tube	96,492
8	Metal stamp, press and coat.	213,261	㉙	Misc. vehicle mfg.	93,369
9	Mfg. industrial chemicals	200,279	㉚	Miscellaneous textiles	92,851
10	Commercial printing	188,229	㉛	Hardware, tool and cutlery	91,240
⑪	Aircraft and parts	164,361	32	Fruit and vegatable canners	87,873
12	Publishing and printing	157,101	33	Mfgs. misc. elec. prod.	87,483
13	Miscellaneous food	144,919	㉞	Misc. paper converters	85,954
14	Scientific and prof. equip.	136,875	35	Glass and glass prod.	84,593
⑮	Distilleries	131,784	㊱	Veneer and plywood mills	77,420
⑯	Mfgs. elec. industries equip.	130,272	37	Ready-mix concrete	74,172
⑰	Folding cartons and boxes	128,126	38	Truck body and trailer	73,815
18	Fabricated struc. metal	126,165	39	Breweries	73,599
⑲	Mfgs. pharm. and medicines	125,970	40	Soft drink manufacturers	73,079
20	Synthetic textile mills	117,637	41	Iron foundries	69,004
㉑	Women's clothing	114,482		Canadian Average:	67,651

SOURCE: EDAB Shift-Share Analysis, Oct. 1975

Circled numbers designate those groups for which data were estimated

C) GEOGRAPHIC TRENDS - THE CENTRE ECONOMY VERSUS THE PERIPHERAL ECONOMY

In this section the following four hypotheses will be empirically tested:

1. The geographic concentration of plants in the key industries - the Centre Economy - is higher than that of plants in other industries;

2. The geographic concentration of plants in key industries has been increasing at a faster rate than plants in other industries;

3. The incidence of the high level of concentration for plants in key industries is the area known as the Axis;

4. The geographic incidence of the increased concentration of plants is the Axis area.

I Level of Geographic Concentration

In order to measure the degree of geographic concentration the Pietra Ratio was employed. (For a technical description of this Ratio see the Appendix.) If an industry is evenly distributed among all provinces the Pietra Ratio will be zero; if an industry is completely concentrated in one province the Pietra Ratio equals one. Therefore, the closer the Pietra Ratio for an industry is to one the more concentrated it is.

The distribution of Pietra Ratios for the key industries (as identified by the degree of forward and backward linkages) was compared to the distribution of Pietra Ratios for the non-key industries in 1961 and 1971. In each test performed, it was found that at the 95% level of significance, there was no difference in the distributions (see Tables Thirteen and Fourteen). Based upon this research it would appear that key industries are no more geographically concentrated than non-key industries.

As a further test, each of the industries within the key industry classification was ranked ordinally by the degree of linkages and by the Pietra Ratio. A Spearman Rank Correlation test was performed for the years 1961 and 1971. In each of the four tests,no significant correlation was found between the degree of linkages and the size of the Pietra Ratio (see Table Fifteen).

II Changes in Concentration

The empirical evidence also tends to reject the hypothesis that the key industries are increasing in concentration more quickly than the non-key industries. The evidence indicates that geographic concentration appears to be decreasing over time and that, if anything, the non-key industries are decreasing in concentration more quickly. However, the differences in the rate of deconcentration between the key and non-key groups are not statistically significant at the 95% level of confidence (see Table Thirteen and Fourteen).

III Incidence of Geographic Concentration

The third hypothesis states that the key industries are more concentrated in Ontario and Quebec than the other manufacturing industries are. The Pietra ratio is an inappropriate measure to test this hypothesis; the Pietra ratio measures the degree of concentration for the distribution of plant locations for the industry considered as a whole. An industry with a high degree of concentration could be primarily located in Alberta, Ontario or any other province and the incidence of concentration cannot be obtained from the Pietra ratio. To test this hypothesis we will use a variant of what is commonly called the concentration ratio. For each industry the percentage of its total employment located in Ontario and Quebec was calculated. Then the industries were grouped into key and non-key classes using the high forward and backward linkage criterion to define key industries.

The results of the empirical work tend to reject the hypothesis. Although the level of activity for most industries in Ontario and Quebec is high, there is no statistically significant difference at the 95% level of confidence between the levels of concentration in the key and non-key industries.* In fact, if anything, the empirical work indicates that on average the level of concentration in Ontario and Quebec for the non-key industries is slightly higher (see Tables Sixteen and Seventeen).

IV Changes in the Incidence of Concentration

The mean average percentage change of the level of industrial concentration for Ontario and Quebec declined marginally for both the key and non-key

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*(The average share of employment in the manufacturing industries in Ontario and Quebec is significantly higher than these two provinces' share of the Canadian population. In 1971, 63.7% of Canada's population resided in Ontario or Quebec.)

TABLE THIRTEEN: Concentration of Key and Non-Key Industries High Linkages of Manufacturing Sector to all Sectors

a) Level of Concentration

1961:	Key		Non-key
No. of industries	14		87
Mean Average Pietra Ratio	0.645		0.685
Standard Deviation	0.105		0.105
t - Statistic		-1.29	
Critical t-statistic for significant difference in distributions		±2.00	

1971:	Key		Non-key
No. of industries	10		64
Mean average Pietra Ratio	0.623		0.654
Standard deviation	0.118		0.114
t - Statistic		-0.795	
Critical t Statistic		±2.00	

b) Change in Concentration

1961 - 1971	Key		Non-key
No. of industries	10		58
Mean Average change in Pietra Ratio	-0.011		-0.034
Standard deviation	0.027		0.167
t - Statistic		0.054	
Critical t Statistic		±2.00	

TABLE FOURTEEN: CONCENTRATION OF KEY AND NON-KEY INDUSTRIES
HIGH LINKAGES WITHIN THE MANUFACTURING SECTOR

a) Level of Concentration

1961:	Key		Non-key
No. of industries	13		88
Mean Average Pietra Ratio	0.660		-0.682
Standard deviation	0.105		0.105
t - Statistic		-0.710	
Critical t Statistic for significant difference in distribution		±2.00	

1971:	Key		Non-key
No. of industries	7		67
Mean average Pietra Ratio	0.639		0.651
Standard deviation	0.122		0.114
t - Statistic		-0.261	
Critical t Statistic		±2.00	

b) Change in Concentration

1961-1971:	Key		Non-key
No. of industries	7		61
Mean average change in Pietra Ratio	0		-0.034
Standard deviation	0.012		0.490
t - Statistic		0.181	
Critical t Statistic		±2.00	

TABLE FIFTEEN: SPEARMAN RANK CORRELATION ANALYSIS HIGH BACKWARD AND FORWARD LINKAGES AND CONCENTRATION WITHIN THE KEY INDUSTRY CATEGORY

a) High Linkages of Manufacturing to all Sectors

	1961	1971
Spearman Rank Correlation	-0.2	-0.406
Critical Value for Significance	0.457	-0.564

b) High Linkages Within Manufacturing

	1961	1971
Spearman Rank Correlation	0.077	0.107
Critical Value for Significance	0.475	0.714

TABLE SIXTEEN: CONCENTRATION OF KEY AND NON-KEY INDUSTRIES IN ONTARIO AND QUEBEC HIGH LINKAGES OF MANUFACTURING TO ALL SECTORS

a) Concentration Ratios

1961:	Key		Non-Key
Number of Industries	15		92
Mean Average Concentration Ratio	79.1		84.6
Standard Deviation	17.6		15.8
t - Statistic		-1.22	
Critical t Statistic for significant difference in distributions		±2.00	

1971:	Key		Non-Key
Number of Industries	13		68
Mean Average Concentration Ratio	76.2		81.0
Standard Deviation	17.7		15.9
t - Statistic		3.8	
Critical t Statistic for significant difference in distributions		±2.00	

b) Change in Concentration Ratios

1961 - 1971	Key		Non-Key
Number of Industries	13		66
Mean Average Change in Concentration Ratio	-0.93		-0.53
Standard Deviation	4.7		9.1
t - Statistic		-0.15	
Critical t Statistic for significant difference in the distributions		±2.00	

TABLE SEVENTEEN: CONCENTRATION OF KEY AND NON-KEY INDUSTRIES IN ONTARIO AND QUEB HIGH LINKAGES WITHIN THE MANUFACTURING SECTOR

a) Concentration Ratios

1961:	Key		Non-Key
Number of Industries	14		94
Mean Average Concentration Ratio	83.7		83.9
Standard Deviation	10.5		14.0
t - Statistic		0.18	
Critical t Statistic for significant difference in distributions		±2.00	

1971:	Key		Non-Key
Number of Industries	10		71
Mean Average Concentration Ratio	80.6		81.1
Standard Deviation	11.3		16.9
t - Statistic		-0.89	
Critical t Statistic for significant difference in distributions		±2.00	

b) Change in Concentration Ratios

1961 - 1971	Key		Non-Key
Number of Industries	10		69
Mean Average Change in Concentration	0.48		-0.61
Standard Deviation	3.2		9.0
t - Statistic		0.04	
Critical t Statistic		±2.00	

industry groups. However, again the distributions for the two groups were not significantly different at the 95% level of confidence (see Tables Sixteen and Seventeen).

D) FACTORS INFLUENCING CONCENTRATION

If, as we have postulated, key industries exist which are more important than others to the process of growth and development, the implication is that efforts may be made through government policy to attract these industries to Manitoba. The success or failure of these efforts will depend upon the strength of certain factors which influence concentration. This section contains the results of certain empirical tests which attempt to determine the strength of such factors.

I Mobility and Growth

In this section two hypothesis were tested. The first was the hypothesis that mobility, defined here as inter-provincial shifts in employment, and growth in employment are correlated because an expanding industry is more likely to expand or re-locate in new territory, if conditions so dictate, than is a stagnant or declining industry. If this hypothesis was found to be true, efforts directed at attracting an expanding industry would appear to prove more fruitful than those directed at a stagnant or declining industry. If no significant positive correlation is found, the implication would be either that the hypothesis is not true or that economic conditions offered no incentive for geographic re-location.

The second hypothesis was that there is a correlation between growth industries and key industries (identified by high forward and backward linkages). This hypothesis in conjunction with the first hypothesis leads to the implication that efforts directed at attracting key industries would prove to be the most fruitful. That is to say, if mobility varies with growth and if growth correlates with key industries then mobility varies with key industries.

Following P. Hampton ("Regional Economic Development in New Zealand", Journal of Regional Science, Vol. 8, No. 1, 1968), the relationship between mobility and growth was tested by the computation of a correlation coefficient between the two variables. The mobility measure was based on the shifts of employment among provinces for the period 1961-69.* The growth measure used was the average annual percentage change in employment over the period 1961-1969. The correlation coefficient obtained was very low (0.12) and did not signal the existence of the postulated relationship between employment growth and mobility.

However, the relationship between employment growth and key industries was found to be significant. Using a Spearman rank correlation coefficient, the hypothesis was true at the 95% level of significance. Therefore, key industries tend to be growth industries.

The lack of a significant relationship between mobility and growth does not entirely invalidate the theory that attempts to attract key industries would prove the most fruitful. The recurring problem of confidentiality of data has, not doubt, weakened the mobility measure seriously. A priori, the hypothesis appears reasonable, and further inquiry into this area may provide the necessary empirical backing.

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* The mobility measure for a given industry (Mi) is defined as:

$$Mi = \frac{\sum_{j=1}^{n} \left| Dij \right|}{\frac{1}{2} \left(\bar{N} + N \right)_i}$$

where: $\bar{N}$ and N represent total manufacturing employment in 1961 and 1969 respectively

n represents the number of provinces

$Dij = \Delta Pij - Pij \left(\Delta Pi/Pi \right)$

It should be noted that this measure of mobility could be large for a contracting industry as well. Therefore, as a further test the industries were divided into growth and non-growth industries and the correlations between growth and mobility calculated for each classification. No significant relationships were found.

II Economies to Scale

Another factor which could conceivably affect concentration is the presence of economies to scale. Economies to scale can be of two types: internal, relating to the production process within the plant itself; and external, relating to factors outside the realm of the production process, such as various elements of the infrastructure. If either of these two phenomena exist, then industrial concentration in particular regions could be expected.

We intended to test for the presence of internal and external economies to scale in Ontario and Quebec, the two provinces in which most of the Canadian manufacturing employment is concentrated. The presence of a significant number of large plants in Ontario and Quebec relative to the rest of Canada would signal the existence of internal economies to scale. If plant sizes in Ontario and Quebec were similar to those across Canada but the level of concentration was much higher than elsewhere, one would suspect that external economies to scale existed.

Unfortunately, these hypotheses proved to be untestable. Required for their testing is data, by 3 digit SIC industry groupings, on average plant size in each province. These data were unavailable and hence the hypotheses as formulated remain untestable.

'Appendices'

Appendix 1

Technical Description of the Specialization Co-efficient and the Pietra Ratio.

A) A) Specialization Co-efficient

$$S.C._j = \left[\sum_{i=1}^{M} \left| \frac{Eij}{Ej} - \frac{Ei}{E} \right| \Big/ 2 \right] \quad \ldots. (1)$$

Where:

$S.C._j$ ≡ Specialization Coefficient for province j

Eij ≡ total employment in industry i for province j

Ej ≡ total employment in all industries for province j

Ei ≡ total employment in industry i for Canada

E ≡ total employment in all industries in Canada

Equation (1) says that the Specialization Coefficient for any given province is the sum of the absolute differences of the relative size of each industry in the province and the relative size of the same industry in Canada divided by two.

Therefore, if the structure of the provincial economy is identical to the Canadian economy then

$$\left| \frac{Eij}{Ej} - \frac{Ei}{E} \right| = 0 \text{ for all industries and '}S.C._j\text{' will be zero.}$$

The more the provincial economy differs in structure from the Canadian economy, the closer '$S.C._j$' will be to one. Thus '$S.C._j$' can range from zero to one.

Notice that in effect the degree of specialization of any province is measured by its degree of similarity to the structure of the Canadian economy. The measure gives no indication as to how specialized the Canadian economy is and thus the economic implication is that the distribution of industries at the national level which serves as a benchmark is optimal. A conceptual weakness of this measure for comparing the changes in specialization of a province over time is that the bench-mark does not remain constant. Thus, all the analyst can say is that over time the structure of a province is becoming more like or more unlike the structure of the Canadian economy. If the structure of the province becomes more like the structure of the nation over time it may be because the provincial structure changed or the Canadian structure changed or both. A practical weakness of this measure is that it requires information on the relative size of every industry in the province. Confidentiality requirements often prevent Statistics Canada from publishing data on every industry in a province. (For further details see W. Isard, et. al. Methods of Regional Analysis, New York: John Wiley and Sons, Inc. 1960, pp. 270-273).

B) PIETRA RATIO

$$Pj = 1/2 \left[\frac{\;\frac{|Eij - Ej/N|}{N}\;}{Ej/N} \right] \qquad \ldots\ldots\ (2)$$

Where: Pj = Pietra ratio for any province j

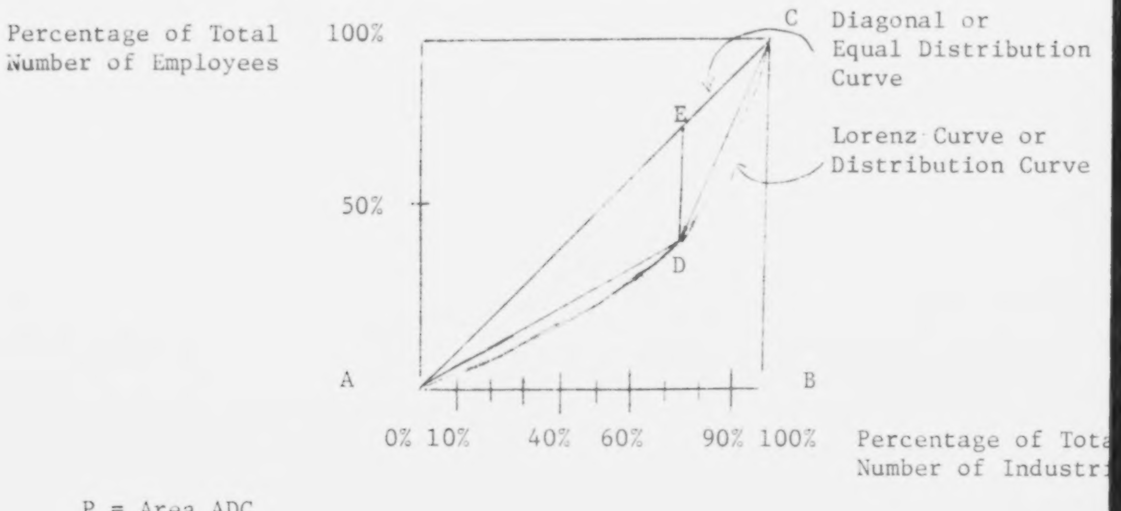
Eij = total employment in industry i for province j

Ej = total employment in all industries for province j

N = total number of industries

Equation (2) says that the Pietra ratio for any given province is equal to one half the sum of the absolute deviation of each industry from the (mean) average sized industry in the province divided by the total number of industries in the province and that this result is divided by the (mean) average sized industry. In other words, the Pietra ratio is equal to one half the relative mean deviation. Therefore, if there is an even distribution (all industries are the same size), 'P_j' will be zero. If at the other extreme, the province has all its employment in one industry, 'P_j' will be one. Thus, 'P_j' can range from zero to one.

The Pietra ratio can be described geometrically as follows:


Percentage of Total Number of Employees
100%
50%
C
Diagonal or Equal Distribution Curve
E
Lorenz Curve or Distribution Curve
D
A
B
0%
10%
40%
60%
90%
100%
Percentage of Tota
Number of Industr

$$P = \frac{\text{Area ADC}}{\text{Area ABC}}$$

Where AC or the diagonal represents even distribution and the Lorenz Curve represents the actual distribution of industries within the province, one measure of distribution, the Gini ratio divides the area between the diagonal and the Lorenz Curve by the area under the diagonal (ABC). To obtain a value for the Gini ratio, one must know the size of every industry in the province. Due to confidentiality constraints, Statistics Canada does not publish such complete information for every province. Thus, an alternative measure, the Pietra ratio has been selected. The Pietra ratio divides the area of the largest possible triangle (ADC) within the area between the diagonal and the Lorenz Curve by the area under the diagonal (ABC). From observation of the diagram it can be seen that the Pietra ratio could be equal to the Gini but will generally be smaller. To calculate the Pietra ratio, the size of every industry need not be known; only point 'D' needs to be known. It can be proven that the Pietra ratio equals ED/100. ED is the largest vertical line between the Lorenz Curve and the diagonal and it can be easily discovered. (For further details see E.M. Singer, Anti-Trust Economics, Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1968, pp. 144-142.)

Appendix 2

3 Digit S I C Components of R & D-identified Key Industries

1) Electrical Products

a) Electrical Products:

#331	Mfgs. of Small Electrical Appliances
332	Mfgs. of Major Electrical Appliances
334	Mfgs. of Household Radio and T.V. Receiver
335	Communications Equipment Manufacturing
336	Mfgs. of Electrical Industrial Equipment
337	Battery Manufacturing
338	Mfgs. of Electrical Wire and Cable
339	Mfgs. of Misc. Electrical Products

b) Miscellaneous Manufacturing:

#381	Scientific and Professional equipment Mfgs.

2) Chemical Based

a) Food and Beverages:

#101	Slaughtering and Meat Processors
103	Poultry Processors
105	Dairy Products Industry
111	Fish Products Industry
112	Fruit and Vegetable Canners and Preservers
123	Feed Mfgs.
124	Flour Mills
125	Breakfast Cereal Mfgs.
128	Biscuit Mfgs.
129	Bakeries
131	Confectionary Mfgs.
133	Sugar Refineries
135	Vegetable Oils Mills
139	Misc. Food
141	Soft Drink Mfgs.
143	Distilleries
145	Breweries
147	Wineries

b) Rubber:

#161	Rubber Footwear Mfgs.
163	Rubber Tire and Tube Mfgs.
169	Other Rubber Industries

c) Textiles:

#183	Cotton Yarn and Cloth
193	Wool Yarn
197	Wool Cloth
201	Synthetic Textile Mills
211	Fibre Preparing Mills
212	Thread Mills
213	Cordage and Twine
214	Narrow Fabric
215	Pressed and Punched Felt Mills
216	Carpet, Mat and Rug Industry
218	Textile Dyeing and Finishing Plants
219	Linoleum and Coated Fabrics Industry
221	Canvas Products Industry
223	Cotton and Jute Bag Industry
229	Misc. Textile

d) Petroleum Products:

#365	Petroleum Refineries
369	Other Petroleum and Coal Products

e) Chemical and Chemical Products:

#371	Explosives and Ammunication Mfgs.
372	Manufacturing of Mixed Fertilizers
373	Manufacturing of Plastics and Synthetic Resins
374	Drugs and Medicines
375	Paint and Varnish Manufacturing
376	Manufacturing of Soap and Cleaning Compounds
377	Manufacturing of Toilet Preparations
378	Manufacturing of Industrial Chemicals
379	Other Chemical Industires

3) Machinery and Transportation Equipment

a) Machinery:

#311	Agricultural Implement Industry
315	Misc. Machinery and Equipment Manufacturing
316	Commercial Refrigeration and Air Conditioning Equipment Manufacturing
318	Office and Store Machinery Manufacturing

b) Transportation Equipment:

#321	Aircraft and Parts Mfgs.
323	Motor Vehicle Mfgs.
324	Truck Body and Trailer Mfgs.
325	Motor Vehicle Parts and Accessories Mfgs.
326	Railway Rolling Stock
327	Shipbuilding and Repair
328	Boatbuilding and Repair
329	Misc. Vehicle Mfgs.

4) Metals

a) Primary Ferrous:

#291	Iron and Steel Mills
292	Steel Pipe and Tube Mills
294	Iron Foundries

b) Primary Non-Ferrous:

#295	Smelting and Refining
296	Aluminium rolling, coating and extruding
297	Copper and Alloy rolling, coating and extruding
298	Metal rolling, casting and extruding nes.

c) Metal Fabricators:

#301	Boiler and Plate Works
302	Fabricated Structural Metal Industry
303	Ornamental and Architectural Industry
304	Metal Stamping, Pressing, ang Coating Industry
305	Wire and Wire Products Mfgs.
306	Hardware, Tool and Cutlery Mfgs.
307	Heating Equipment Mfgs.
308	Machine Shops
309	Misc. Metal Fabricating Industries

5) Wood Based

a) Wood:

#251	Sawmills (including Shingle Mills)
252	Veneer and Plywood Mills
254	Sash, Door and Other Millwork Plants (including Hardware Flooring
256	Wooden Box Mfgs.
258	Coffin and Casket Industry
259	Misc. Wood Industries

b) Furniture and Fixtures:

#261 Household Furniture Mfgs.
264 Office Furniture Mfgs.
266 Misc. Furniture Mfgs.
268 Electrical Lamp and Shade Mfgs.

c) Paper:

#271 Pulp and Paper Mills
272 Asphalt Roofing Mills
273 Paper Box and Bag Mfgs.
274 Misc. Paper Converters

6) Other Manufacturing

a) Non-Metallic Mineral:

#341 Cement Mfgs.
343 Lime Mfgs.
345 Gypsum Products Mfgs.
347 Concrete Products Mfgs.
348 Ready-Mix Concrete Mfgs.
351 Clay Products Mfgs.
352 Refractories Mfgs.
353 Stone Products Mfgs.
354 Mineral Wool Mfgs.
355 Asbestos Products Mfgs.
356 Glass and Glass Products Mfgs.
357 Abrasives Mfgs.
359 Other Non-Metallic Mineral Products

b) Tobacco:

#151 Leaf Tobacco Processing
153 Tobacco Products

c) Leather:

#172 Leather Tanneries
174 Shoe Factories
175 Leather Glove Factories
179 Luggage, handbag and small leather goods

d) Knitting Mills:

#231 Hosiery Mills
239 Other Knitting Mills

Source: Statistics Canada Publications
#13-203, "Industrial Research and Development Expenditures in Canada"

Appendix 3 Table 1

Pietra Ratios, Canadian 3 Digit S I C Industries,
1961 and 1971

		Pietra	
3 Digit SIC Industry		1961	1971
#101	Slaughtering	.447	.461
103	Poultry	C	.489
111	Fish Products	.494	.425
112	Fruit and Vegetable Processors	.606	.539
105	Dairy Products	.479	.433
123	Feed Industry	.569	.495
124	Flour Mills	.499	C
125	Breakfast Cereal	.807	C
128	Biscuit Mfgs.	.663	.562
129	Bakeries	.515	.516
131	Confectionary Mfgs.	.614	.690
133	Sugar Refineries	C	.350 +
135	Vegetable Oil Mills	.433 +	.265 +
139	Misc. Food	.631	C
141	Soft Drink Mfgs.	.529	.531
143	Distilleries	.685	.645 +
145	Breweries	.452	.457
147	Wineries	.750	.690 +
151	Leaf Tobacco	.800	C
153	Tobacco Products Mfg.	.798	C
161	Rubber Footwear	.628 +	C
163	Rubber Tire and Tube	C	C
169	Other Rubber	C	.600 +
172	Leather Tanneries	.753	.791 +
174	Shoe Factories	.771	.768
175	Leather gloves	.647	.629
179	Luggage and Handbag	.756	.264 +
183	Cotton yarn and cloth	.757	.564 +
193	Wool yarn mills	.762	.770
197	Wool cloth	.737	.746

3 Digit SIC Industry		Pietra	
		1961	1971
#201	Synthetic Textile Mills	.785	.451 +
211	Fibre Preparing Mills	.766	.656 +
212	Thread Mills	.800	C
213	Cordage and Twine	.714	.708
214	Narrow Fabric Mills	.800	.800
215	Pressed and Punched Felt Mills	.754 +	.728 +
216	Carpet, Mat and Rug	.774	.689 +
218	Textile Dyeing and Finishing	.800	.794
219	Linoleum and Coated Fabrics	.800	C
221	Canvas Products	.690	.525
223	Cotton and Jute Bag	.463 +	.469 +
229	Misc. Textile	.728	.562 +
231	Hosiery Mills	.774	.640 +
239	Knitting Mills	.683	.594 +
243	Men's Clothing	.649	.621
244	Women's Clothing	.716	.617
245	Children's Clothing	.761	.818
246	Fur Goods	.657	.731
247	Hat and Cap	.668 +	.713
248	Foundation Garment	.800	.800
249	Other Clothing	.771	.583 +
251	Shingle, Saw and Planing Mills	.564	.566
252	Veneer and Plywood Mills	.649	.647
254	Sash, door, Hardware Flooring	.475	.489
256	Wooden box	.654	.662
258	Coffin and Casket	.584	.587 +
259	Misc. wood	.554	.412
261	Household Furniture	.647	.675
264	Office Furniture	.768	.775
266	Misc. Furniture	.581	.639
268	Electric Lamp and Shade	.746	.722
271	Pulp and Paper	.550	.549
272	Asphalt Roofing	.537 +	C

3 Digit SIC Industry		Pietra	
		1961	1971
#273	Paper Box and Bag	.642	.623
274	Misc. Paper Converters	.732	.722
286	Commercial printing	.638	.632
287	Plate making	.701	.671
288	Publishing only	.668	.682
289	Publishing and Printing	.500	.471
291	Iron and Steel Mills	.669	.683 +
292	Steel Pipe and Tube	.634	.589 +
294	Iron Foundries	.659	.661
295	Smelting and Refining	.656 +	.552 +
296	Aluminium, Roll, Cast and Extrud.	.770	.742
297	Copper and Alloy Roll.	.698 +	.578 +
298	Metal Roll, Cast.	.686	.699
301	Boiler and Plate Works	.605	.670
302	Fab. Struc. Metal	.548	.496
303	Orn. and Arch. Metal	.650	.603
304	Metal Stamp, Press and Cast.	.660	.680
305	Wire and Wire Prods.	.729	.718
306	Hardware, Tool and Cutlery	.750	.715
307	Heating Equipment Mfg.	.689	.692
308	Machine Shops	.467	.485
309	Misc. Metal Fab.	.671	.668
311	Agric. Implements	.803	.657
315	Misc. Machinery and Equipment	.696	.682
316	Comm. Refrigeration and Air Cond.	.698 +	.735
318	Office and Store Mach.	.807	.699
321	Aircraft and Parts	.676	.682
323	Motor Vehicle Mauufacturing	.841	.723
324	Truck Body and Trailer	.591	.424
325	Motor Veh. Parts and Acces.	.866	.865
326	Railroad Rolling Stock	.516 +	.467 +
327	Shipbuilding and Repair	.476 +	.482 +
328	Boatbuilding and Repair	.484	.506

3 Digit SIC Industry		Pietra 1961	Pietra 1971
#329	Misc. Vehicle Mfg.	.725	.827
331	Mfgs. small Elect. App.	.768	.722 +
332	Mfgs. Major App.	.540 +	.608 +
334	Mfgs. Household Radio and T.V.	.795	.783
335	Communication Equipment	.764	C
336	Mfgs. Elec. Ind. Equip.	.778	.728
337	Battery Mfgs.	.572	.592
338	Mfgs. Elec. Wire and Cable	.757	.689 +
339	Mfgs. Misc. Elec. Prod.	.760	.765
341	Cement Mfgs.	.430 +	.467 +
343	Lime Mfgs.	.469 +	.603 +
345	Gypsum	C	C
347	Concrete Prod.	.551	.537
348	Ready-Mix Concrete	.485	.493
351	Clay Prod.	.565	.596
352	Refractories	C	C
353	Stone Prods.	.546	C
354	Mineral Wool	.688 +	C
355	Asbestos Prods.	.783	.753
356	Glass and Glass Prods.	.699	.682 +
357	Abrasives Mfg.	.798	.800
359	Other Non-Met.Mineral Products	C	.619
365	Petrol Refineries	C	.449 +
369	Other Petrol. and Coal Products	C	.253 +
371	Explosives and Ammunition	.719	C
372	Mixed Fertilizer	.646 +	.650
373	Mfgs. Plastics and Syn. Resins	.631 +	.660 +
374	Mfgs. Pharm. and Med.	.779	.784
375	Paint and Varnish Mfg.	.641	.645
376	Mfgs. Soap and Cl. Cmpds.	.767	.737
377	Toilet Preps.	.800	.800
378	Ind. Chems.	.626	.595

3 Digit SIC Industry		Pietra 1961	1971
#379	Other Chemical Ind.	.732	C
381	Scientific and Prof. Equipment	.777	C
382	Jewellery and Silverware	.753	.751
383	Broom, Brush and Mop	.549	.606
384	Venetial Blinds	.506	.547 +
385	Plastic Fab. NES	.725	.731
393	Sporting Goods and Toys	.781	.774
397	Signs and Displays	.539	.542
398	Miscellaneous[1]	C	C
399	Miscellaneous[2]	C	C

Note: Confidentiality of data resulted in obtaining only a lower bound on the Pietra ratio in some industries. These bounds are followed by "+".

[1] Includes:

i) Button, Buckle and Fastner Mfgs.
ii) Candle Mfgs.
iii) Hair Goods Mfg.
iv) Artificial Flowers Mfg.
v) Model and Pattern Mfg.
vi) Musical Instrument Mfg.
vii) Typewriter Supplies Mfgs.
viii) Pens and Pencil Mfgs.

[2] Includes:

i) Stamp and Stencil Mfgs.
ii) Stationary, Art Goods Mfgs.
iii) Umbrella Mfgs.
iv) Artificial Ice Mfgs.
v) Other Misc.

Source: Calculated from Statistics Canada, Publications, #31-203 (1961), #31-204 (1961), #31-205 (1961), #31-206 (1961), #31-207 (1961), #31-208 (1961), #31-203 Vol. I (1971)

Appendix 3 Table 2

Manufacturing Concentration in Ontario and Quebec, 1961 and 1971

Industry			% of Total Employment in Ontario and Quebec 1961	% of Total Employment in Ontario and Quebec 1971
1.	#101	Slaughtering and meat processing	59.5%	59.9%
2.	#103	Poultry products	n/a	67.4
3.	#105	Dairy products	67.9	63.3
4	#111	Fish products	7.7	11.1
5.	#112	Fruit & Vegetable canners	79.0	73.9
6.	#123	Feed Mfgs.	76.9	69.5
7.	#124	Flour Mills	51.5	C
8.	#125	Breakfast Cereal Mfgs.	C	C
9.	#128	Biscuit Mfgs.	86.3	83.8
10.	#129	Bakeries	71.5	71.6
11.	#131	Confectionary Mfgs.	81.4	89.0
12.	#133	Sugar Refineries	C	C
13.	#135	Vegetable Oil Mills	53.3(1)	36.5(1)
14.	#139	Misc. Food	83.1	C
15.	#141	Soft drink Mfgs.	72.9	73.1
16.	#143	Distilleries	88.5	84.5
17.	#145	Breweries	65.2	65.7
18.	#147	Wineries	85.0(1)	65.2(1)
19.	#151	Leaf Tobacco Processing	100.0	C
20.	#153	Tobacco Products Mfgs.	99.8	C
21.	#161	Rubber Footwear Mfgs.	72.8(2)	C
22.	#163	Rubber Tire and Tube	C	C
23.	#169	Other Rubber	37.8(2)	60.1(1)
24,	#172	Leather Tanneries	95.3	79.1(1)
25.	#174	Shoe Factories	96.8	97.1
26.	#175	Leather glove	77.4	80.6

Industry			% of Total Employment in Ontario and Quebec 1961	% of Total Employment in Ontario and Quebec 1971
27.	#179	Misc. Leather	96.3%	36.4%(1)
28.	#183	Cotton yarn and cloth	95.7	66.4 (2)
29.	#193	Wool yarn mills	96.2	96.5
30	#197	Wool cloth mills	93.7	94.6
31	#201	Synthetic textile mills	98.5	55.1 (2)
32.	#211	Fibre Preparing mills	96.6	75.6 (1)
33.	#212	Thread mills	100.0	C
34.	#213	Cordage and twine	80.6 (1)	74.2 (1)
35.	#214	Narrow fabric mills	100.0	100.0
36.	#215	Pressed and punched felt mills	85.4 (1)	72.8 (1)
37.	#216	Carpet, mat.& rug	97.4	88.9
38.	#218	Textile dyeing	100.0	99.4
39.	#219	Linol. & coated fabrics	100.0	C
40.	#221	Canvas products	77.0	68.0
41.	#223	Cotton and jute bag	66.3	66.9
42.	#229	Misc. textile	92.8	56.2 (1)
43.	#231	Hosiery mills	97.4	64.0 (2)
44.	#239	Other knitting mills	88.3	59.4 (2)
45.	#243	Men's clothing	84.9	82.1
46.	#244	Women's clothing	91.6	71.7 (2)
47.	#245	Children's clothing	96.1	81.8 (2)
48.	#246	Fur goods	83.8	93.1
49.	#247	Hat and cap	86.8	91.3
50.	#248	Foundation garment	100.0	100.0
51.	#249	Other clothing	97.1	68.3 (2)
52.	#251	Shingle and Sawmills	26.2	27.8
53.	#252	Veneer and plywood mills	39.6	36.7
54.	#254	Sash door and hardwood flooring	58.4	63.0

Industry			% of Total Employment in Ontario and Quebec	% of Total Employm in Ontario and Que
			1961	1971
55.	#256	Wooden box	85.4%	86.2%
56.	#258	Coffin and Casket	78.4	78.7
57.	#259	Misc. wood	73.4	61.2
58.	#261	Household furniture	84.7	87.5
59.	#264	Office furniture	96.8	97.5
60.	#266	Misc. furniture	78.1	83.9
61.	#268	Electric lamp & shade	94.6	92.2
62.	#271	Pulp & paper mills	70.6	64.7
63.	#272	Asphalt roofing	73.7	C
64.	#273	Folding cartons & boxes	84.2	82.3
65.	#274	Misc. paper converters	93.2	92.2
66.	#286	Commercial printing	83.8	83.2
67.	#287	Plate making, etc.	90.1	87.1
68.	#288	Publishing only	86.8	88.2
69.	#289	Publishing & printing	70.0	66.9
70.	#291	Iron and steel mills	84.3	88.3
71.	#292	Steel pipe and tube	82.3	67.2(1)
72.	#294	Iron foundries	85.9	86.1
73.	#295	Smelting and refining	75.6	75.2
74.	#296	Alum. rolling, cast., etc.	97.0	94.2
75.	#297	Copper and Alloy roll, cast. etc.	89.8	61.8(1)
76.	#298	Metal roll, cast, etc.	88.6	89.9
77.	#301	Boiler and plate works	80.5	87.0
78.	#302	Fab. structural metal	74.8	66.5
79.	#303	Ornamental & Arch. metal	85.0	80.3
80.	#304	Metal stamp, press & coat.	86.0	88.0
81.	#305	Wire and wire prods.	92.9	91.8
82.	#306	Hardware, tool & cutlery	95.0	91.5

Industry			% of Total Employment in Ontario and Quebec 1961	% of Total Employment in Ontario and Quebec 1971
83.	#307	Heating equipment	88.9%	89.2%
84.	#308	Machine shops	64.9	61.9
85.	#309	Misc. metal fab.	87.1	86.8
86.	#311	Agric. implement	93.1	75.3
87.	#315	Misc. mach. & equip.	89.6	88.2
88.	#316	Comm. Regrig. & air condit.	79.8 (1)	93.5
89.	#318	Office & store machinery	90.7 (1)	89.9
90.	#321	Aircraft & parts	87.6	88.2
91.	#323	Motor vehicle mfg.	96.6	82.3 (1)
92.	#324	Truckbody and trailer	79.1	53.8
93.	#325	Motor veh. pts. & acces.	97.6	98.4
94.	#326	Railroad rolling stock	61.2	56.7 (1)
95.	#327	Shipbuilding & repair	54.3	46.4 (2)
96.	#328	Boatbuilding & repair	52.7	57.6
97.	#329	Misc. vehicle mfg.	92.5	92.7 (2)
98.	#331	Mfgs. small elec. appliances	96.8	82.2 (1)
99.	#332	Mfgs. major appliances	74.0	70.8 (1)
100.	#334	Mfgs. household radio & T.V.	99.5	98.3
101.	#335	Commun. equip. mfgs.	96.4	C
102.	#336	Mfgs. elec. indus. equip.	97.1	92.8
103.	#337	Battery mfgs.	77.2	78.4
104.	#338	Electric wire & cable	95.7	89.5
105.	#339	Misc. elec. products	96.0	96.5
106.	#341	Cement mfgs.	60.2	66.7
107	#343	Lime mfgs.	67.7	80.3
108.	#345	Gypsum products mfg.	C	C
109.	#347	Concrete prods. mfg.	75.1	73.7
110.	#348	Ready-mix concrete	67.3	61.1
111.	#351	Clay prods. mfg.	76.5	79.6

			% of Total Employment in Ontario and Quebec	% of Total Employment in Ontario and Quebec
Industry			1961	1971
112.	#352	Refractories mfg.	C	C
113.	#353	Stone prod. mfgs.	74.6%	C
114.	#354	Mineral wool mfgs.	78.8 (1)	C
115.	#355	Asbestos prods. mtg.	98.3	95.3%
116.	#356	Glass & glass prods. mtg.	89.9	88.2
117.	#357	Abrasives mtg.	99.8	100.0
118.	#359	Other non-met. min. prods.	C	81.9
119.	#365	Petrol refining	41.3 (1)	54.9 (1)
120.	#369	Other petrol and coal prods.	46.7 (1)	33.9 (1)
121.	#371	Explosives & ammun. mfgs.	91.9	C
122.	#372	Mfgs. mixed fertilizers	84.6	85.0
123.	#373	Mfgs. plastics & syn. resins	83.1	86.2
124.	#374	Mfgs. pharm. & medicines	97.9	98.4
125.	#375	Paint and varnish mfg.	84.1	83.5
126.	#376	Soap and cleaning cmpds.	96.7	93.7
127.	#377	Toilet preps.	100.0	100.0
128.	#378	Industrial chems.	82.6	79.5
129.	#379	Other chems.	93.2	C
130.	#381	Scientific and Prof. equip.	97.7	C
131.	#382	Jewellery and silverware	95.3	95.1
132.	#383	Broom, brush and mop	74.9	70.3
133.	#384	Venetian blind	70.6	64.6
134.	#385	Plastic fabricators nes	92.5	93.1
135.	#393	Sporting goods and toys	98.1	97.4
136.	#395	Fur dressing and dyeing	C	54.0 (2)
137.	#397	Signs and displays	70.6	72.2
138.	#398	Miscellaneous	C	C
139.	#399	Miscellaneous	C	C

(1) Ontario only

(2) Quebec only

* Includes:
- i) Button, buckle & fastner mfgs.
- ii) Candle mfgs.
- iii) Hair goods mfgs.
- iv) Artificial flower mfgs.
- v) Model and pattern mfgs.
- vi) Musical instrument mfgs.
- vii) Typewriter supplier mfgs.
- viii) Pen and pencil mfgs.

** Includes:
- i) Stamp and stencil mfgs.
- ii) Stationary and art goods mfgs.
- iii) Umbrella mfgs.
- iv) Artificial ice mfgs.
- v) Other misc.

Source: Calculated from Statistics Canada publications

# 31 - 203 (1961)
# 31 - 204 (1961)
# 31 - 205 (1961)
# 31 - 206 (1961)
# 31 - 207 (1961)
# 31 - 208 (1961)
# 31 - 203, Vol. 1 (1971)

Research Paper #3

"Structure of Manufacturing in Manitoba"

A Comparative Analysis

By
John McGuire
and
Carole Swan
Spring 1976

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Appendix

A) INTRODUCTION

The format of this paper is similar to Paper One, "Structure at the Division Level". Part A, the "Introduction" is divided into three subsections: Purpose, Summary of Findings, and Implications for Policy. Part B, "Potential Growth Industries" examines the manufacturing industries in Manitoba using the criteria described in the "Introduction". The analysis will first examine industries at the group level of aggregation (Subsection One) and then at the S.I.C. three digit level of aggregation* (Subsection Two). In order to maintain consistency with Paper Two, employment is the unit of measurement used. Data on value added have also been analyzed and because such a measure of manufacturing activity appears conceptually more appropriate, the results of the analysis using value added are compared to the results of the analysis using employment in an appendix to this paper.

I Purpose

Judgement of the growth potential of an industry in Manitoba ideally requires intensive analysis of that industry. However, owing to the large number of industries and the constant monitoring required in times of change, it is not economical to study each industry intensively and continuously. As a second best alternative, some criteria must be used for the selection of industries to study intensively at one point of time. It is the purpose of this paper to describe one possible set of criteria and to use these criteria to isolate a few industries in Manitoba whose recent performance suggests that intensive industry level analysis would be fruitful. It must be stressed that insofar as we are concerned about government structural rationalization measures (for a definition and discussion of this term see Introductory Paper, p. 12), the criteria used must isolate industries which are not growing (or contracting) at a desired rate rather than just isolating fast and slow growing industries.

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* According to the method of data classification used by Statistics Canada, industrial statistics are disaggregated into divisions such as Agriculture, Construction, Manufacturing, etc. Each of these divisions are then further disaggregated into groups which are in turn disaggregated into industries. These three levels of disaggregation are often referred to as one digit level, two digit level and three digit level respectively. In some cases, three digit level industries are further disaggregated into four digit level industries.

An initial step towards the discovery of the growth potential of manufacturing industries involves examination of their growth performance over the recent past. Second, the relative importance of each industry within the province should be evaluated. A very small industry which is growing very quickly (or contracting very quickly) would not have the same short term repercussions on provincial performance as would a large industry. However, from a long term point of view small industries cannot be ignored. In addition, for comparative purposes, information on the relative size of each industry within Canada as a whole and on the size of the Manitoban sector in each industry will be gathered.

Third, information on the origins of growth is required; that is, was growth of an industry in Manitoba due to the fact that the industry was growth industry in Canada or was it a result of factors solely within the province? Shift-Share Analysis will be used as a guide for a preliminary judgement. Fourth, in an attempt to further isolate the causes of growth, information as to the nature of the product market (i.e. regional, national or international) will be examined.

To summarize the suggested criteria for the selection of industries for further study are:

1. Growth

$\Delta \mathrm{Man}_i / \mathrm{Man}_i$ = Rate of growth of industry i in Manitoba from year one to year two.

2. Relative Size

a) $\mathrm{Man}_i / \mathrm{Man}$ = Size of industry i in Manitoba relative to the total Manitoban manufacturing division.

b) $\mathrm{Can}_i / \mathrm{Can}$ = National size of industry i relative to the total Canadian manufacturing division.

c) $\mathrm{Man}_i / \mathrm{Can}_i$ = Size of industry i in Manitoba relative to the national size of industry i.

3. Shift-Share*

a) $$\Delta Man_i - Man_i \cdot \left(\Delta Can/Can\right) = Man_i \left(\Delta Can_i / Can_i - \Delta Can / Can\right) + Man_i \left(\Delta Man_i / Man_i - \Delta Can_i / Can_i\right)$$

b) $$\Delta Man - Man \cdot \left(\Delta Can/Can\right) = \sum_i \left[Man_i \left(\Delta Can_i / Can_i - \Delta Can / Can\right)\right] + \sum_i \left[Man_i \left(\Delta Man_i / Man_i - \Delta Can_i / Can\right)\right]$$

4. Scope of Market

a) $\dfrac{Man_i - ManX_i}{Man_i}$ = Relative amount of Manitoban production in industry i that is sold in Manitoba

= the dependence of provincial producers on provincial markets

b) $\dfrac{ManS_i - ManM_i}{ManS_i}$ = Relative amount of total Manitoban purchases of industry i's products that are supplied by Manitoban producers

= the dependence of the provincial market on provincial producers

$$= \frac{Man_i - ManX_i}{Man_i - ManX_i + ManM_i}$$

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* For a discussion of shift-share analysis see the Appendix to the Introductory Paper.

Where

Man_i = size of industry in Manitoba at the beginning of a time period

ΔMan_i = change in size of industry i in Manitoba over a given time period

Man = size of the manufacturing division in Manitoba at the beginning of a time period

ΔMan = change in size of the manufacturing division in Manitoba over a given time period

Can_i = national size of industry i at the beginning of a time period

ΔCan_i = change in the national size of industry i over a given time period

Can = size of the Canadian manufacturing division at the beginning of a time period

ΔCan = change in the size of the Canadian manufacturing division over a given time period

$ManX_i$ = amount of Manitoban exports from industry i

$\therefore Man_i - ManX_i$ = amount of Manitoban production in industry i that was sold in the Manitoban market

$ManM_i$ = amount of Manitoban imports that compete with products of industry i

$ManSi$ = total apparent Manitoban demand for products of industry i

$= Man_i - ManX_i + ManM_i$

II Findings

1. Although there were some shifts in the provincial shares of total national manufacturing employment during the period 1952 to 1973, the shifts were not dramatic. Perhaps a period of little more than twenty years is too short to observe underlying long term terms.

2. To the surprise of no one, Ontario and Quebec had the lion's share of manufacturing employment. Together these two provinces accounted for about 80% of the total manufacturing employment although, according to the 1971 census, these two provinces accounted for 63.6% of Canada's population.

3. Manufacturing activity within these two provinces is highly concentrated in the St. Lawrence-Great Lakes lowlands - an area referred to as the Axis by M. Yeates in his book, Main Street: Windsor to Quebec City, (Toronto: The MacMillan Company of Canada, 1975). According to Yeates, the Axis accounted for 72.9% and 71.7% of the manufacturing labor force in 1961 and 1971 respectively and 53.1% and 55.3% of Canada's population in 1961 and 1971 respectively (Yeates, p. 27).

4. However, taken separately, it can be observed that Ontario was growing relatively in manufacturing employment and Quebec was declining. Ontario appears to have made most of its increase between 1961 and 1965 when its share increased from 47.2% to 49.2%. Both before and after this period its share remained rather constant. Quebec on the other hand appears to have been declining in its share of national employment after 1961; its share fell from 33.5% in that year to 30.5% in 1973.

5. As the increase in its share over time implies, Ontario experienced a faster rate of growth in manufacturing employment than the nation considered as a whole during the period 1961 to 1969 (29.2% compared to 23.8%). Shift-share analysis indicated that this strong growth performance was due primarily to Ontario's industry mix rather than its competitiveness.* The industry mix component was responsible for 72% of the province's net relative growth in this period whereas the competitive effects accounted for 28% of the net relative growth. From 1969 to 1973, Ontario's growth rate slipped marginally below the

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* Competitiveness in shift-share analysis means only that a province's share of an industry's national employment has increased. It does not refer to either the behaviour of the companies or the number of competitors in the industry.

national average (4.4% compared to 4.5%). Therefore, the net relative growth was very small in terms of potential jobs lost. However, in constrast to the 1961 to 1969 period, the industry mix component was negative. This change in the contribution in the industry mix effect can mean one of two things. Either the distribution (structure) of industries changed in Ontario or the distribution of growth rates of the industries at the national level changed in an unfavourable way for Ontario. In all probability, the latter alternative is the most important.

6. In contrast, Quebec's growth rate was below the national average in both periods and the competitive component was analyzed to have been responsible for the largest part of the negative net relative change (62% and 90% for the periods 1961 to 1969 and 1969 to 1973 respectively).

7. Although not identical to the national distribution of industries, Ontario and Quebec were the two most diversified in their industry structure and the most similar to the Canadian structure (see Table Three). However, to the extent that their structure differed from the Canadian structure, the difference was favourable to Ontario and unfavourable to Quebec during the 1961 to 1969 period (Ontario had a positive industry mix component and Quebec had a negative one-see Table Two). During the 1969 to 1973 period, conditions changed. The industry mix component began to have a negative effect on Ontario's growth, and although still negative in Quebec, the industry mix component was not as strong as it was in the previous period.

8. Although British Columbia's share of employment increased from 7.2% to 8.3% between 1952 and 1973, most of its above average national growth appears to have occured between the years 1952 (or earlier) and 1955, and the years 1969 to 1973. During the 1960's its rate of growth was below the national average and hence its share tended to decline. The British Columbia manufacturing sector is fairly specialized. (Its Pietra Ratios and Specialization Coefficients are relatively large - see Table Three.) When this knowledge is coupled with the results of the shift-share analysis certain inferences can be made. During the 1961 to 1969 period, net relative growth was negative due to the fact that the negative industry mix effect over-powered the positive competitive effects component. Thus, relative to the distribution of growth versus non-growth

industries at the national level, British Columbia was specialized in a few slow growth industries but was competing well in them (see Table Two). During the 1969 to 1973 period, in all probably the few industries British Columbia specialized in began to grow more quickly at the national level (a positive industry mix component) and British Columbia was still competing well in them (see Table Four).

9. The Prairie Province's share of national manufacturing employment went up from 6.8% in 1952 to 7.2% in 1973. This increase was due primarily to Alberta whose share increased from 2.5% in 1952 to 3.2% in 1973. Saskatchewan's share remained relatively constant throughout at 1% and Manitoba's share declined from 3.4% in 1952 to 3.0% in 1965 and remained approximately constant thereafter.

10. Alberta's experience was much the same as British Columbia. It has a rather high degree of specialization in its industry structure. This structure had a negative effect on its growth in the 1960's (a negative industry mix component) but the province competed well in the few industries it had (positive competitive effects component). However, unlike British Columbia, its competitive component was more powerful than the industry mix component and as a result the province grew more quickly than the national average. Again like British Columbia during the 1969 to 1973 period, changes in the relative growth rates of industries at the national level favoured Alberta's industrial mix and this province continue to compete well also. Finally, and unlike British Columbia, Alberta's increasing share of total manufacturing employment and hence Alberta's above average growth performance was relatively steady over time.

11. Saskatchewan was the slowest growing province in Manufacturing during the 1960's. However, because it was so small its slow growth did not lower its relative size markedly. Its industrial structure was highly specialized (high Pietra Ratios and Specialization Co-efficients) and shift-share analysis revealed negative industry mix and competitive effects components. In other words, Saskatchewan had only a few industries that were growing slowly nationally and the province was competing poorly in them. During the period 1969 to 1973, however, Saskatchewan's rate of growth increased sharply to over twice the rate at the national level (9.7% compared to 4.5% for the nation). Shift-share

analysis is of no apparent help in explaining what happened; both the industry mix and competitive effects components were negative-clearly an unrealistic result as one of the component, at least, must have been positive. (The sum of two negative influences cannot yield a positive net relative growth.) The problem lies with the fact that due to confidentiality constraints, no information was available for many of its industries. Two inferences can be made however. Since the performance according to shift-share analysis remained as poor in the 1969 to 1973 period as it was in the 1961 to 1969 period, then the upsurge in growth from 1969 onward did not occur in the industries were the data was published. Second because, the data was confidential for these growth industries, there can only be three of fewer producers in each of these industries in Saskatchewan. Therefore, growth occured in Saskatchewan in monopolistic industries (at least within Saskatchewan borders).

12. Manitoba's manufacturing sector which, next to Ontario and Quebec, was the most diversified, grew more slowly than the national average during the 1950's and 1960's and hence its share fell from 3.4% in 1952 to 3.0% in 1965. Although it had negative values for both the industry mix and the competitive effects, the industry mix component was the more powerful constraining force (80% compared to 20%) during the 1961 to 1969 period. However, during the 1969 to 1973 period, Manitoba's growth rate was higher than the national average. The reason for this was due to a dramatic increase in the competitive effects component. The industry mix component remained negative but was not nearly as strong.

13. The Maritime provinces' share decreased from 5.4% in 1952 to 4.7% in 1973. This decline was due primarily to Nova Scotia, the largest manufacturing province in the Maritimes; its share fell from 2.6% in 1952 to 2.1% in 1973. New Brunswick, the next largest manufacturing maritime province, saw its share dip, particularily from 1961 to 1965, but by 1973 its share of 1.7% had almost returned to its previous high of 1.9% in 1952. All the Maritime provinces have a narrow distribution of industries but due to confidentiality constraints, shift-share analysis cannot yield a reliable measure of how well the provinces performed in these few industries.

14. When the trends in relative shares of all the provinces are considered over time, it appears that Ontario, Alberta and British Columbia are slowly

increasing in size while the rest are decreasing. One could speculate that manufacturing activity is moving westward from the Maritimes and Quebec into Ontario, and that manufacturing from Manitoba and Saskatchewan is either moving eastward into Ontario or westward into Alberta and British Columbia. However, the measure used is very crude and the trends are neither strong nor regular. Therefore, before investigation into the causes of these trends is initiated a more careful study is required to determine if the trends do indeed exist. D. Michael Ray and Thomas N. Brewis in a study, "The Geography of Income and its Correlates" The Canadian Geographer, xx, 1, 1976, pp. 41-71, shows some evidence that the historic east-to-west migration of economic development is continuing.

15. Manitoba's and Saskatchewan's better performance relative to the national average growth rate in 1969 to 1973 compared to 1961 to 1969 has to be placed in some perspective. The national average growth rate was approximately 2.6% per year from 1961 to 1969 (simple uncompounded average) compared to an annual rate of 0.9% from 1969 to 1973. Manitoba's improved performance in a relative sense was because its growth rate in the 1969 to 1973 period did not decline as greatly as the national growth rate. Saskatchewan, on the other hand actually increased its annual growth rate from 1.4% in the 1960's to 1.9% in the early 1970's. The forces which kept Manitoba's growth rate from declining as much as the national rate did may have been the same or may not have been the same as the forces that increased Saskatchewan's growth at a time when the nation was in a recession. Prince Edward Island, New Brunswick (strong growth provinces in the 1960's) and Quebec were badly hurt by the recession. Alberta and Ontario like Manitoba were adversely affected but remained relatively strong; British Columbia and Newfoundland like Saskatchewan actually increased their rates of growth and thus appeared to have been unaffected by the recession.

16. Differences in cyclical behaviour in employment were discerned. The manufacturing sector in Canada entered into a recessionary period around 1965 and the recession appeared to deepen as time passed. From 1961 to 1965, the sector grew at a rate of 16.1%,from 1965 to 1969 the rate declined to 6.7% and from 1969 to 1973 the rate declined further to 4.5%. (The timing of the cyclical changes could be pin-pointed with more accuracy by the use of annual or quarterly data.) In Manitoba the growth rate was much steadier. During the expansionary period of the early 1960's its manufacturing growth rate was only 10.8%. From

1965 to 1969 it fell somewhat to 6.6% which was about the national average. From 1969 to 1973 it remained at 6.6% which was better than the national average. The inference to be made is that due to its industry mix, this province does not grow as quickly in expansionary times but it does perform relatively well in recessionary times (see Tables Five, Six, Ten and Eleven).

17. Based upon size and growth in both Canada and Manitoba during the 1960's the Metal Fabricating Industries and the Transportation Equipment Industries showed the most potential for further growth. Both of these groups were large and fast growing (see Tables Five and Six).

18. The next two groups which showed the most growth potential were the Electrical Products Industries and the Machinery Industries. The former group was large and fast growing in Canada, and small and fast growing in Manitoba. The question why this group of industries is small in Manitoba needs to be answered. The latter group although small in both Canada and Manitoba, grew the fastest of all the groups in both jurisdictions.

19. Textiles (primary) was small in both jurisdictions but while it was growing slowly at the national level it was growing quickly in Manitoba. The reasons for the differences in growth preformance need to be known.

20. The Furniture and Fixture Industries and the Miscellaneous Manufacturing Industries were small in both Canada and in Manitoba. However, while both groups were growing quickly at the national level they were growing slowly in the province. Again, the differences in growth performance need to be explained.

21. The largest group of industries in both Canada and Manitoba was the Food and Beverage Industries. In both jurisdictions this group was growing slowly, especially after 1965. In fact in Manitoba after 1965 it was actually contracting in size and in Canada it was contracting after 1969. This slow-growth group is relatively larger in Manitoba than in Canada considered as a whole.

22. Primary Metal Products, Paper Products and Chemical Products were all large groups in Canada with average growth. However, they all were growing slowly or below average in Manitoba. The first group (primary Metals) was also large in Manitoba but the last two were small (see Table Seven).

23. Closer analysis of the Metal Fabricating Industries revealed the following points:

a) Although at the national level this group of industries displayed a cyclical pattern similar in timing to the cycle for manufacturing, the amplitudes of the group's cycles are larger. While the manufacturing sector's growth fell from 16.1% in the 1961 to 1965 period to 6.7% in the 1965 to 1969 period to 4.5% in the 1969 to 1973 period, the Metal Fabricating Industries Group experienced a sharp decline from 32.6% in the 1961 to 1965 period to 5.5% in the 1965 to 1969 period to 2.3% in the 1969 period to 1973 period. Notice that during the expansionary period this group grew faster than the average for the manufacturing sector but during the recessionary period it grew more slowly.

b) The same cycle for this group in Manitoba can be discerned but with an apparent lag in timing. During the 1961 to 1965 period the group grew by 28.2% in Manitoba (below the rate for the group at the national level but considerably above the rate of 10.8% for manufacturing as a whole in Manitoba). Although the rate of growth for the group in Manitoba dropped sharply to 13.7% in the 1965 to 1969 period it was not as dramatic as it was at the national level (32.6% to 5.5%). Thus, compared to the growth performance of this group on average elsewhere in Canada and compared to the growth rate of the manufacturing sector in Canada and in Manitoba this group in Manitoba was performing well. However, in the 1969 to 1973 period, while the group at the national level struggled along at 2.5% growth rate, the group's growth rate in the province was minus 10.8%; it actually contracted in size.

c) The cyclical pattern of growth for this group in Manitoba is consistent with a characteristic of a heartland-hinterland industry that is often referred to as the 'cushion effect'. The 'cushion effect' characteristic refers to the fact that especially in a highly cyclical industry, the hinterland acts as a buffer for the heartland against the volatility of demand. During boom periods the hinterland picks up a disproportionate share of the increased demand and prospers but during recessionary periods the incidence of the reduced demand falls heavily on the hinterlands. The effectiveness of the cushion depends on how quickly the orders from customers can be re-directed from plants in the heartland to the hinterland and vice-versa. In this group of industries there does appear to be a lag which could indicate that the orders are not easily transferred. The ability to transfer orders at all require that at least two conditions be met. First, the products cannot be characterized by regional markets and second, the nature of ownership and thus control must be such that orders can be re-directed or the nature of customer preferences is such that they prefer to buy from the heartland plants first. Little can be said about the second condition until an intensive industry level study is conducted. However, something can be said about the first condition.

d) The products of this group of industries appear to be regional. This judgement is based upon the following observations. First, the levels of domestic production in 1961 were close to the level of domestic demand and the level of imports and exports were a very small percentage of total domestic supply or demand. Therefore, there was little product movement across international borders, at least.* Second, almost all of the shipments of this group was classified to intermediate demand (the industries in the group tended to supply materials to other producers rather than to final consumers) and by far the largest customer was the construction trade. The construction trade is largely regional in nature. Thus, the evidence on the regionality of the products tends to reject the 'cushion effect' hypothesis and instead ties the fortunes of this group of industries strongly to the performance of the construction trade (see Tables Sixteen and Seventeen).

e) This group of industries is composed of nine three-digit level industries of which six are relatively important in Manitoba. These six are i) the Fabricated Structural Metal Industry, ii) the Ornamental and Architectual Metal Industry, iii) the Metal Stamping, Pressing and Coating Industry, iv) the Heating Equipment Industry, v) the Machine Shops Industry and, vi) the Miscellaneous Metal Fabricating Industries (see Table Fifteen). The Boiler and Plate Works Industry, the Wire and

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* More recent data with respect to these variables are available. However, compilation of such data is time consuming and should be left to the industry level study. The 1961 data, properly compiled, was readily available from the Input-Output Table.

Wire Products Industry and the Hardware, Tools and Cutlery Industry are relatively small in Manitoba.

f) Of the six relatively important industries, the Metal Stamping, Pressing and Coating Industry merits the highest priority for further intensive study. It is not as highly dependent upon the construction trade as most of the other industries in this group are. In 1961 a large percentage of its shipments went to a large number of other industries including 14.4% to Fruit and Vegetable Canners and 3.1% to Dairy Processors (see Table Seventeen). Much of this diversity in its customers is explained by the fact that a major product of this industry is metal containers. The relatively high level of imports (16.7% of domestic demand) indicates that the products of this industry are not regional. Finally, the growth rate of this industry during the 1960's at the national level was well above the average for the manufacturing sector as a whole (as indicated by a positive industry mix component in the shift-share analysis - see Table Fifteen).

Despite these positive features the industry did not grow well in Manitoba. The competitive effects component was so strongly negative that the industry in Manitoba not only grew at a rate below the national rate for this industry, but at a rate well below the national average for all manufacturing and the provincial average for all manufacturing. As a result Manitobans' share of national employment in this industry fell from 5.3% in 1961 to 3.7% in 1969. This is a large industry in Manitoba (the manufacturing sector as a whole in Manitoba accounts for only 3.0% of total national manufacturing employment) that is for some reason or other doing badly.

Our preliminary data indicates some possible reasons. The markets for the products of this industry appear to be national and even international* (a high level of imports and a relatively high level of intra-industry shipments). Second, the low level of exports and the high level of intra-industry shipments indicate that there could be a trend towards geographic concentration facilitated by monopoly power.(Paper #3, Appendix Three, Tables One and Two, confirm that there was indeed increased geographic concentration in this industry during the 1960's.)

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* It should be noted that this was one of the enabling conditions for the 'cushion effect', see pp.172-173.

g) Although the Wire and Wire Products Industry and the Hardware, Tool and Cutlery Industry were both small in Manitoba, using an analysis similar to the one used for the Metal Stamping, Pressing and Coating Industry, one must conclude that it would be useful to conduct a study of these two industries as well. Both were growing well nationally, had a high level of imports in 1961 and had a large number of customers besides construction. The Hardware, Tool and Cutlery Industry also had a fairly large percentage of its production shipped to final demand customers.

24. Closer analysis of the Transportation Equipment Group of industries revealed the following points:

a) The Transportation Equipment Group was and is very large in terms of employment in both Canada and Manitoba. In 1973 it accounted for 9.9% of all manufacturing employment in Canada and for 10.6% in Manitoba. At the Canadian level, only the Food and Beverage Group was larger (12.7%) and at the provincial level only the Food and Beverage Group (20.8%) and the Clothing Group (14.4%) were larger.

b) The growth of this group from 1961 to 1973 was also impressive. From 1961 to 1969, it grew by 58.9% in Canada (only the Machinery Industries grew more quickly - 61.4%); in Manitoba during the same period this group grew by 108.4% (again only the Machinery Industries grew more quickly - 122.6%). During the 1961 to 1973 period its rate slowed down somewhat in both Canada and Manitoba (9.9% and 24.0% respectively for the five year period). However, it still ranked third and second respectively in Canada and Manitoba in terms of rapidity of growth (see Tables Five, Six, Ten and Eleven).

c) In terms of increases in actual employment, its large size and rapid growth made it one of the most important sources of new employment. From 1961 to 1969 at the national level there were 58,475 new jobs net created; this was the largest increase of all the groups. In Manitoba, this group also ranked first in the absolute number of new jobs created (a total of 2,334 new jobs net were created).

From 1969 to 1973 it created 15,603 and 1,075 new jobs net in Canada and Manitoba respectively. Only the Wood Products Industries at the national level and the Clothing Industries at the provincial level created more jobs (see Tables Ten and Eleven).

d) However, this group of industries went through a drastic period of contraction during the 1950's declining by 22.4% in Canada (only the Clothing Industry contracted more - 25.5%) during the 1952 to 1959 period and by 24.6% in Manitoba (only the Textile Industries - 36.0% and the Knitting Industries - 44.9% contracted more). Hence, from a longer term point of view, 1952 to 1973, the growth of this group was not so impressive. It is apparent that the group went through a re-construction phase in the 1950's and then grew quickly thereafter.

e) Like the Metal Fabricating Industries Group, the Transportation Equipment Industries Group displays large cyclical oscillations about its secular growth path. Unlike the Metal Fabricating Group, the Transportation Equipment Group in Manitoba tends to lead in the timing of its cycles compared with the national cycles for this group.

f) Shift-share analysis at the group level show that the contraction of the Transportation Equipment Group in Manitoba during the 1950's was due almost entirely to the industry mix component (see Table Twelve). In other words, this group of industries in Manitoba was primarily following national trends. However, during the expansionary period of the 1960's and early 1970's the competitive effects component was more important in Manitoba and increasingly so (see Tables Thirteen and Fourteen). Clearly, the province was doing well in a growth industry.

g) Of the eight three-digit level industries classified to this group of industries only five were important employers in Manitoba, and the pattern of growth for these five were not uniform. These five are Aircraft and Parts (SIC #321), Motor Vehicle Manufacturers (SIC #323), Truck Body and Trailer Manufacturers (SIC #324), Motor Vehicle Parts and Accessories Manufacturers (SIC #325) and Railway Rolling Stock Manufacturers (SIC #326).

h) The Railway Rolling Stock Industry was by far the largest employer in this group of industries in Manitoba in 1961. This industry had been contracting quickly in Manitoba during the 1950's, a trend which continued during the 1960's. Shift-share analysis indicates that the cause was due primarily to the industry mix component in both decades. In fact, in the 1950's the competitive effects component was marginally positive; this indicates that the industry in Manitoba was not declining as quickly as it was on average in all the provinces. Relatively good growth performance in a slow growth industry is a danger signal. However, during the 1960's the competitive effects component was negative which indicates that the producers in Manitoba were finally reacting to the apparent adverse demand conditions (see Table Eighteen).

i) If the Railway Rolling Stock Industry is excluded from the group, the group during the 1950's in Manitoba actually had positive growth. In other words, the large and contracting Railway Rolling Stock Industry was the major explanation for negative growth of the group as a whole in Manitoba. This fact is not true for Canada considered as a whole. Although the Railway Rolling Stock Industry declined just as quickly at the national level as it did within Manitoba, this industry was not as large an employer relatively speaking in Canada as it was in Manitoba and other industries in the group, contrary to the Manitoba experience, contracted (or grew slowly) relative to the national average manufacturing growth rate (see Table Eighteen, Part B).

j) Although the Aircraft and Parts Industry was not a growth industry in Canada, during the period 1952 to 1973, it grew quickly in Manitoba. However, the growth in Manitoba was very cyclical. In addition, the product markets for this industry appear to be international and the level of research and development expenditures are very high.

k) The Motor Vehicle Manufacturers and the Motor Vehicle Parts and Accessories Manufacturers are two closely linked industries; the former is a major customer of the latter. During the 1950's when the manufacturing sector as a whole grew slowly, these two industries nationally grew slower than the national average manufacturing growth rate; during the 1960's when the growth rate of the manufacturing sector picked up, these two industries grew faster than the national average. These trend should be contrasted to the experience in Manitoba. During the 1950's both these industries had a positive competitive effects component* and it was very strong for the Motor Vehicle Parts and Accessories Industry. This industry more than doubled its employment (116.7% growth rate). In the 1960's both these industries had a negative competitive effects component in Manitoba. This component was so strongly negative for the Motor Vehicle Industry, that the industry actually contracted in size in Manitoba despite its strong growth rate nationally.

Thus, while these industries were declining in relative size nationally during the 1950's (a period of slow growth generally), Manitoba was getting a larger share of each industry. However, during the 1960's (a period of fast growth generally) while these industries were growing in relative size nationally, Manitoba was getting a smaller share of each industry. No doubt the monopolistic character of these industries and the U.S. - Canada Auto Trade Agreement had their repercussions in Manitoba.

1) The Truck Body and Trailer Industry, a newly created three-digit level industry in the 1960 revisions of the SIC code, grew nationally at a faster rate than the average for the manufacturing sector. However, its growth in Manitoba was even faster. Manitoba's share of this industry's national employment increased from 3.9% in 1961 to 15.0% in 1969. (Employment between the same two years in Manitoba grew from 130 to 1,515; an increase of 1,385. If the industry in Manitoba had grown at the same rate that the industry grew nationally only 261 new jobs would have been created. Clearly Manitoba is competing well in a fast growth industry.)

Products of this industry include such things as buses and bus chassis, trucks and truck chassis, cabin or house type trailers, other trailers and semi-trailers, military motor vehicles, motorcycles and special purpose motor vehicles. According to the import and export statistics contained in the 1961 Input-Output Table, the markets for these products are international rather than regional in nature.

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* Due to the fact that employment in Manitoba for the Motor Vehicles Manufacturing Industry was only estimated, not too much reliance can be placed upon the resulting estimated values for the shift-share components.

III Summary and Implications

The St. Lawrence-Great Lakes lowlands which can be roughly defined as a one hundred mile band running from Windsor to Quebec, is Canada's manufacturing neartland. In 1971 approximately 72% of the Canadian manufacturing labour force was in this area compared with approximately 55% of Canada's population. The dominance of the manufacturing heartland remained relatively stable during the period 1952 to 1973. However, within the heartland there was observed a growth in Ontario's share and a decline in Quebec's; most of this change appears to nave occurred in the 1960's. Shift-Share Analysis reveals that most of Ontario's increase in size during the 1960's was due to its industrial mix, while most of Quebec's decline was almost entirely due to the regional or competitive effects component. From 1969 to 1973, Ontario's growth rate dipped marginally below the national average and again the main reasons seem to have been associated with the industry mix component.

During the period 1952 to 1973 British Columbia (the third largest manufacturing province - 8.3% of employment in 1973) and Alberta were the only two other provinces to have increased their share of Canada's manufacturing division. British Columbia's manufacturing growth was sporadic. It increased ts share in the early 1950's then its growth dipped slightly below the national average until approximately 1969 when its growth rate accelerated. Alberta, which presently only has about 3% of Canada's manufacturing division grew in elative size gradually throughout the period. The structures of industry in he manufacturing division for both these provinces were fairly specialized but oth provinces had positive competitive effects components in the shift-share nalysis for each sub-period of study during the period 1952 to 1973. This means hat of the manufacturing industries these provinces had, the provincial growth ates tended to be greater than the national growth rates. It was the industry ix component which was sometimes negative and thus acted as a drag on the elative growth rates of these two provinces.

All of the other provinces tended to decline in relative size during his period. Manitoba's manufacturing sector fell in relative size from 3.4% n 1952 to 3.0% in the 1970's. Although next to Ontario and Quebec Manitoba as the most diversified structure in its manufacturing division, and although hift-share analysis revealed negative competitive effects components for every eriod except the one from 1969 to 1973, the industry mix component was the largest xplanation for the relatively slow growth. In other words, there is need for improvement in the existing distribution of manufacturing industries in Manitoba.

One clear implication emerges from all these trends. The existing economic forces are operating in such a way that the manufacturing division is slowly rationalizing towards Ontario, Alberta and British Columbia. The two western growth provinces have a narrow industrial base but the industries they do have are currently growing quickly and these two provinces are competing well in them. Ontario has the most diversified industries base but, unlike Quebec and Manitoba which also have a diversified base, the rationalizing process is keeping the industry mix biased towards growth industries.

Another and related implication is that Manitoba's relatively slow growth is due both to its industry mix and to its inability, in general, to grow quickly within the industries it has compared with other sectors of the same industries in other provinces. Therefore, if the government wished to improve the performance of the manufacturing sector in Manitoba, it should address itself towards improving the industry mix, (perhaps by promoting key industries and their related clusters) and towards improving the over-all environment for manufacturing activity by investigating the influence of macro-forces and policies.

It should be noted that the Manitoban manufacturing sector is less susceptible to business cycles than is the Canadian manufacturing sector. One cause of the relative stability, the diversified structure and the slow growth may be that the main markets for Manitoban manufactured products are the prairie provinces; this cause is a commonly cited observation by many Manitobans. If the prairies are the main markets for Manitoban products, then the product markets are small and their growth rates are tied to the growth of other divisions

When the twenty manufacturing groups were classified by size and rate of growth in Canada and in Manitoba, two groups, the Metal Fabricating Industries, and the Transportation Equipment Industries, were found to be large and fast growing in both constituencies. The industries within these two groups were then subjected to the scanning process and as a result two industries were identified as potentially good subjects for further intensive study. These two industries were the Metal Stamping, Pressing and Coating Industry (SIC #304) and the Truck Body and Trailer Industry (SIC #324).

The Metal Stamping, Pressing and Coating Industry has been growing at a good rate in Canada with a good number of linkages (it has been classified as a key industry in Paper No. Two) and the scope of its market appears to be more than provincial. Yet, this industry has not been growing well in Manitoba despite the fact that one of its major products is metal containers and some of its more important customers are in the Food and Beverage Industries (a group of industries which is large in Manitoba).

The Truck Body and Trailer Industry has been growing at a very fast rate in Canada and even faster in Manitoba. Manitoba's share of this industry's national employment grew from 3.9% in 1961 to 15.0% in 1969. This industry includes the manufacturers of recreational trailers (as well as buses, trucks and commercial trailers). Several of the manufacturers of recreational trailers are currently in financial difficulties. Perhaps, much of the trouble stems from the fact that this segment of the industry is in a 'shaking out' phase of the product cycle. A study of the rationalizing process of this industry is timely, for, if at all possible, steps should be taken to insure that not too many Manitoban plants are 'shaken out' of what appears to be an industry with good long term demand potential.

Four other industries as revealed by the scanning process would also be interesting to study. They are: the Wire and Wire Products Industry (SIC #305), the Hardware, Tools and Cutlery Industry (SIC #306), the Motor Vehicles Manufacturers (SIC #323) and the Motor Vehicles Parts and Accessories Manufacturers (SIC #325).

At the time of writing this report, the EDAB staff had not subjected the eighteen other manufacturing groups to the scanning process. However, in an Appendix to this paper the results of the shift-share analysis for each three digit industry is presented in tabular form.

'Part B'

B) POTENTIAL GROWTH INDUSTRIES

I Group Level Analysis

i) Structure and Growth of Manufacturing Employment in the Provinces

In order to give the analysis of potential growth industries in Manitoba some perspective, a brief discription of the relative performance of the Manitoba manufacturing sector as a whole is desirable.

The most interesting observation which surfaces when the provincial shares are considered together is the degree of stability in the distribution of shares over time. While some shifts were apparent, they did not greatly disturb the general distribution of manufacturing activity among the provinces. Manufacturing activity was highly concentrated in Central Canada; approximately 81% of all manufacturing employment was located in Ontario and Quebec from 1952-1969. However, beginning in the 1960's, Quebec has been experiencing a decline in its share while Ontario's share has been increasing(see Table One). An increasing share over time for a province indicates that the employment growth rate for that province was greater than the national average employment growth rate.

British Columbia ranked a poor third in manufacturing activity but its manufacturing sector grew relatively quickly and, as a result, its share rose from 7.2% in 1952 to 8.3% in 1973. If our statistics are reliable British Columbia experienced a boom period in the 1950's, grew at approximately the same rate as the nation during the 1960's and then once again experienced a boom in the early 1970's (see Table One).

Within the Prairie Provinces (the third largest region in manufacturing), Manitoba's share declined somewhat (from 3.4% in 1952 to 3.0% by 1965), Alberta's share increased from 2.5% in 1952 to 3.2% in 1973, while Saskatchewan's small share tended to remain constant at 1.0% (with perhaps a slight upward trend). The net result was a small upward shift in the Prairie's share of national manufacturing employment. It is of interest to know whether Manitoba is losing some of its share to Alberta or whether Manitoba is losing some of its share to Ontario while Alberta is growing quickly in industries that have not been by tradition in Manitoba. Such a question, however, is beyond the scope of this paper (see Paper No. Four, "Forecasting Structural Shifts").

The four provinces in the Maritimes saw their share decline somewhat during this period from 5.4% in 1952 to 4.7% in 1973. The decline in the Maritimes share bottomed out some time in the early 1960's at 4.0% and thereafter experienced a revival. However, the aggregate figures are somewhat misleading. Each of the Maritime Provinces, with the exception of Nova Scotia, tended to maintain its share. Nova Scotia, while not a large manufacturing province in Canada, was the largest in the Maritimes and during the period its share declined (at least until 1965) and thus pulled down the total share for the Maritimes (see Table One).

It is interesting to note that what shifts there have been in relative shares seem to be toward two growth points geographically. Ontario is increasing its share, while Quebec and the Maritimes on the east and Manitoba and Saskatchewan on the west are declining. Alberta and British Columbia are also growing. In contrast, D. Michael Ray and Thomas N. Brewis based upon their research argue that there is a definite east to west movement in economic development which began with the cod fisheries in the Maritimes at the dawn of Canadian history and which has continued up until the present day. (See "The Geography of Income and its Correlates: The Canadian Geographer", xx 1, 1966. 63-64.)

Changes in relative shares in manufacturing employment by provinces over time are caused by differences in provincial growth rates. To the extent that changes in relative shares were present, shift-share analysis can give us some insight into their causes. During the period 1961 to 1969 employment in five provinces grew more quickly than the national average and five grew at a slower rate. All of the provinces except Ontario had negative industry mix components which implies that, compared to the national industrial structure, all the provinces (except Ontario) had a poor mix of growth versus non-growth industries. Such a finding is not unreasonable in light of the fact that Ontario has a large share of total manufacturing employment.

All of the five provinces that grew quicker than the national average had positive competitive effects components which implies that the provincial share of industries in these five provinces increased. In Ontario the industry mix component was a more important contributor to the net relative growth (+72.0%) than was the competitive effects component (+28.0%) but in each of the other four provinces the competitive effects component must have been more powerful than the

TABLE ONE: PROVINCIAL SHARES OF MANUFACTURING EMPLOYMENT IN CANADA

	1952	1955	1961	1965	1969	1973
	%	%	%	%	%	%
Provinces						
British Columbia	7.2	7.9	7.7	7.6	7.5	8.3
Alberta	2.5	2.7	2.9	2.9	3.1	3.2
Saskatchewan	0.9	0.9	1.0	1.0	0.9	1.0
Manitoba	3.4	3.2	3.1	3.0	3.0	3.0
Ontario	47.3	47.3	47.2	49.2	49.3	49.2
Quebec	33.4	33.1	33.5	31.8	31.6	30.5
Prince Edward Island	0.1	0.1	0.1	0.1	0.2	0.1
New Brunswick	1.9	1.7	1.7	1.2	1.7	1.7
Nova Scotia	2.6	2.3	2.1	2.0	2.0	2.1
Newfoundland	0.8	0.8	0.7	0.7	0.7	0.8
Regions						
British Columbia	7.2	7.9	7.7	7.6	7.5	8.3
Prairie Provinces	6.8	6.8	7.0	6.9	7.0	7.2
Ontario and Quebec	80.7	80.4	80.7	81.0	80.9	79.7
Maritimes	5.4	4.9	4.6	4.0	4.6	4.7
TOTAL	100.1	100.0	100.0	99.5	100.0	99.9

Note: Columns may not add to 100% due to rounding

Source: Derived from Statistics Canada, Census of Manufacturing Data industry mix effect or the net relative growth would not have been positive (see Table Two).

Of the five provinces that grew more slowly than the national rate, all but British Columbia had negative industry mix and competitive effects components; British Columbia had a positive competitive effects component but, of course, its influence was not as strong as the industry mix component. It is interesting that two of the other four (Nova Scotia and Quebec) were more strongly hindered by the competitive effects component than the industry mix component while in the other two provinces (Manitoba and Saskatchewan) the industry mix component held down potential employment growth (see Table Two).

Interpretation of the results of shift-share analysis must be made with care due to weaknesses in the data base. For instance, for Prince Edward Island (P.E.I.), there were statistics available for only two of the possible twenty groups of manufacturing industries. However, these two groups accounted for almost three quarters of the total manufacturing employment in this province. There were at least nine other manufacturing groups accounting for the remaining one quarter of total manufacturing employment in P.E.I. but the statistics for these groups were unavailable due to confidentiality restrictions(see Table Two). Thus, it appears that there were nine other manufacturing groups that did not exist at all in P.E.I. during the 1960's. These statistics imply a high degree of manufacturing specialization for P.E.I. The Pietra Ratio and the Specialization Co-efficient, two measures of specialization* support the inference of a high level of specialization (see Table Four). The fact that the industry mix component for P.E.I. is negative implies that the industries in which this province specialized were slow growth industries during the 1961 to 1969 period. The fact that P.E.I. had a high positive competitive effects component implies that P.E.I. was growing relatively fast in these slow-growth industries.

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* Of the two measures of specialization, the Specialization Coefficient is conceptually more appropriate for the purpose at hand than the Pietra Ratio. However, the calculation of the Specialization Coefficient requires data for each industry within each province and the Pietra Ratio does not. Thus, we are left with the dilemma of whether to use a conceptually superior but a less precisely calculated measure or to use a more precisely calculated but conceptually less appropriate measure to indicate the level of manufacturing specialization within the province.

The Specialization Coefficient compares the similarity of a provincial distribution to the national distribution; the Pietra Ratio compares the distribution of a province's manufacturing sector to an even or perfectly proportional distribution (the national distribution of industries is not even). Secondly, the Specialization Coefficient compares the relative size of each industry in a province to its relative size at the national level; the Pietra Ratio does not. A province may have the same Pietra Ratio as the nation and therefore a similar distribution but the ranking of industries by size could be completely different; the Specialization Coefficient does not rank industries by size (see Appendix Paper No. Two for elaboration).

TABLE TWO: SHIFT SHARE ANALYSIS, PROVINCIAL MANUFACTURING EMPLOYMENT, 1961 - 1969 GROUP LEVEL

			Shift-Share Analysis						Coverage			
	Percentage Growth	Net Relative Growth	Actual Net Relative Change 1961-1969	Estimated Net Relative Change 1961-1969	Absolute Components		Percentage Share		Number of Groups		Employment Estimate to Actual	
	%	% Points			Ind. Mix	Comp. Effect	Ind. Mix	Comp. Effect	Used In Estimate	Confident.	1961	1969
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
CANADA:	23.8%	0	0	0	0	0	0	0	20	0	100.0	100.0
PROVINCES:												
1. Prince Edward Is.	55.0%	+31.2	+ 524	+ 507	- 209	+ 717	- 41.2%	+141.2%	2	11	73.5	71.1
2. Alberta	31.2%	+ 7.3	+ 2,918	+ 2,344	- 2,293	+ 4,637	- 98.0%	+198.0%	16	4	96.7	95.8
3. Ontario	29.2%	+ 5.4	+34,298	+34,299	+24,707	+ 9,592	+ 72.0%	+ 28.0%	20	0	100.0	100.0
4. New Brunswick	26.4%	+ 2.5	+ 580	+ 283	- 1,336	+ 1,620	-472.0%	+572.0%	9	11	83.6	82.9
5. Newfoundland	24.8%	+ 1.0	+ 97	+ 725	- 840	+ 1,567	-115.7%	+215.7%	4	3	57.3	62.8
6. British Columbia	22.1%	- 1.7	- 1,803	- 1,598	- 4,694	+ 3,095	-294.0%	+194.0%	17	3	99.3	99.4
7. Nova Scotia	19.4%	- 4.4	- 1,231	- 1,981	- 385	- 1,596	- 19.4%	- 80.6%	11	7	72.3	79.1
8. Manitoba	18.1%	- 5.7	- 2,404	- 1,797	- 1,434	- 362	- 79.8%	- 20.2%	16	4	97.2	98.3
9. Quebec	16.9%	- 6.9	-31,493	-31,491	-12,003	-19,488	- 38.1%	- 61.9%	20	0	100.0	100.0
10. Saskatchewan	12.6%	-11.2	- 1,522	- 1,828	- 1,367	- 460	- 74.8%	- 25.2%	11	6	88.1	83.4
REGIONS:												
1. British Columbia	22.1%	- 1.7	- 1,803	- 1,598	- 4,694	+ 3,095	-294.0%	+194.0%			99.3	99.4
2. Prairie Provinces	22.8%	- 1.0	- 1,008	- 1,281	- 5,094	+ 3,815	-397.7%	+297.8%			98.3	95.4
3. Ontario & Quebec	24.1%	+ 0.3	+ 2,805	+ 2,808	+12,704	- 9,896	+452.4%	-352.4%			100.0	100.0
4. Maritime Provinces	23.8%	0	- 30	- 465	- 2,770	+ 2,308	-595.7%	+496.3%			79.6	84.3

Note: Percentage columns may not add to 100% due to rounding
Source: EDAB Shift-Share Analysis, October, 1975

TABLE THREE: SHIFT - SHARE ANALYSIS, PROVINCIAL MANUFACTURING EMPLOYMENT, 1969 - 1973 - GROUP LEVEL

			SHIFT - SHARE ANALYSIS						COVERAGE			
	Percentage Growth %	Net Relative Growth % Points	Actual Net Relative Change 1969-1973	Est. Net Relative Change 1969-1973	Absolute Componants		Percentage Share		Number of Groups		Employment Est. ÷ Actual	
					Ind. Mix	Comp. Effect	Ind. Mix	Comp. Effect	Used In Estimate	Confi-dential	1969	1973
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
CANADA:	4.5	0	0	0	0	0	0	0	20	0	100.0%	100.0%
PROVINCES:												
1. British Columbia	15.4	+ 10.9	+13,807	+13,627	+4,906	+8,721	+ 36.0%	+ 64.0%	16	4	.99.4	98.2
2. Newfoundland	13.2	+ 8.7	+ 1,068	- 781	- 288	- 493	- 36.9	- 63.1	7	10	62.8	71.5
3. Nova Scotia	10.7	+ 6.2	+ 2,064	- 478	7	- 485	+ 1.5	-101.6	13	6	79.1	82.0
4. Saskatchewan	9.7	+ 5.2	+ 799	- 160	- 129	- 31	- 80.6	- 19.4	11	6	83.4	85.4
5. Alberta	8.6	+ 4.1	+ 2,153	+ 1,919	+ 123	+1,791	+ 6.7	+ 93.3	15	5	95.8	96.3
6. Manitoba	6.6	+ 2.1	+ 1,052	+ 1,120	- 332	+1,452	- 29.6	+129.6	15	5	98.3	97.1
7. Ontario	4.4	- 0.1	- 841	- 824	-2,068	-1,244	-251.0	+151.0	20	0	100.0	100.0
8. New Brunswick	3.3	- 1.2	- 348	- 773	3	- 776	+ 0.4	-100.4	11	9	82.9	93.0
9. Quebec	0.9	- 3.6	-19,074	-18,988	-1,872	-17,116	- 9.9	- 90.1	20	0	100.0	100.0
10. Prince Edward Is.	- 7.9	- 12.4	- 323	- 157	- 82	- 75	- 52.2	- 47.8	2	10	71.1	88.0
REGIONS:												
1. British Columbia	15.4	+ 10.9	+13,807	+13,627	+4,906	+8,721	+ 36.0%	+ 64.0%			99.4	98.2
2. Prairie Provinces	7.9	+ 3.4	+ 4,004	+ 2,879	- 333	+3,212	- 11.6%	+111.6%			74.6	73.5
3. Ontario & Quebec	3.0	- 1.5	-19,915	-19,812	-3,940	-15,872	- 19.9%	- 80.1%			100.0	100.0
4. Maritime Prov.	7.7	+ 3.2	+ 2,461	- 2,189	- 360	-1,829	- 16.4%	- 83.6%			84.3	59.2

Source: Calculated from Statistics Canada, Census of Manufacturing, #31-203

To summarize, despite the fast growth in manufacturing employment in P.E.I. during the 1960 to 1969 period (55.5%), this province's manufacturing sector does not show much potential. P.E.I. was growing relatively quickly in a few industries that were slow-growth industries from a national perspective. Its high rate of growth was no doubt partially a reflection of the fact that its small manufacturing sector (relative to Canada) required only a small increase in employment to register a high growth rate (see Tables One, Two and Three).

The conclusion of a poor potential for P.E.I. is verified somewhat when the period 1969 to 1973 is examined.* During this period employment actually declined by 7.9% which was 12.4 percentage points below the national average. This poor performance was due almost equally to a negative industry mix effect component and a negative competitive effects component (see Table Three).

Similar analyses can be done for each of the other provinces. Of particular interest are the implications these statistics have for Ontario, British Columbia, Alberta, Saskatchwan, and of course Manitoba.

According to the measures of specialization, Ontario and Quebec had the greatest industrial diversification and most closely resembled the national distribution, or structure, of industry. (The fact that all twenty manufacturing groups existed in both provinces and that there were no confidentiality constraints adds some collaborative evidence to the implications of the specialization measures.) However, to the extent that the structures of the provinces differed from the national structure, it appears that Ontario benefited while Quebec did not. Ontario experienced a growth rate of 29.2% which was 5.4 percentage points above the national growth rate; 72% of this positive net relative growth was due to the industry mix component while 28% of it was due to the competitive effects component. In other words, it appears that the majority of Ontario's positive net relative growth was due to the fact that Ontario has a higher proportion of growth industries than the nation. However, the competitiveness of Ontario's manufacturing industries was also a positive influence on growth. Quebec's case

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* The shift-share analysis could not be done for the period 1961 to 1973 because of changes by Statistics Canada in the classification of data in 1971. However, the analysis could be done for the 1969 to 1973 period because Statistics Canada revised the 1969 data in accordance with the new classification scheme. The comparison of the results of the analysis for the two periods can be justified on the grounds that the aggregate results for each province should be only marginally influenced by a change in classifications.

TABLE FOUR: SPECIALIZATION MEASURES OF PROVINCIAL MANUFACTURING INDUSTRIAL GROUPS (EMPLOYMENT)

	PIETRA RATIOS				SPECIALIZATION CO-EFFICIENT		
	1961	1965	1969	1973	1961	1965	1969
1. British Columbia	0.500	0.484	0.470	.474	0.346	0.330	0.323
2. Alberta	0.413	0.398	0.379	.362	0.322	0.300(-)	0.263(-)
3. Saskatchewan	0.515	0.503	0.440	.398	0.435(-)	0.406(-)	0.377(-)
4. Manitoba	0.392	0.384	0.394	.389	0.253	0.251	0.235(-)
5. Ontario	0.271	0.288	0.291	.279	0.128	0.134	0.129
6. Quebec	0.255	0.249	0.254	.230	0.154	0.171(+)	0.146
7. New Brunswick	0.510	0.524	0.524	516+	0.370(-)	0.344(-)	0.367(-)
8. Prince Edward Island	0.635+	0.631	0.710	.718+	0.518(-)	0.540(-)	0.626(-)
9. Nova Scotia	0.403	0.417	0.390	.367+	0.261(-)	0.279(-)	0.290(-)
10. Newfoundland	0.661	0.682	0.710	.472	0.546(-)	0.582(-)	0.387(-)
CANADA	0.256	0.243	0.242	.245	-	-	-

Source: Calculated from Statistics Canada, Census of Manufacturing, #31-201, 203-208 is quite different. Quebec's growth rate was only 16.9 or 6.9 percentage points below the national average. The primary reason for its poor performance appears to be the competitive effect (61.9% of the negative net relative growth) but the industry mix accounted for a significant 38.1% of Quebec's below-average growth).

The trends for these two provinces during the 1969 to 1973 period do not differ greatly from the 1961 to 1969 period. Ontario's growth rate of 4.4% dipped marginally below the national growth rate of 4.5% due to the worsenin of its industry mix component. Obviously the shift in the makeup of growth industries hurt Ontario. Its competitive effects component was still positive bu not strong enough to completely offset the industry mix effect. It must be remembered that because Ontario's growth rate was close to the nation average, the actual number of jobs indicated by the shift-share analysis was small compare to total provincial employment. Thus Ontario's share of national employment in manufacturing hardly changed at all. Quebec continued to grow at a rate considerably below the national average (0.9% compared to 4.5%). Once again the main reason for this poor performance was poor competitive performance rather than a poor industrial mix. The industry mix component accounted for only 9.1% of the negative net relative growth while the competitive effects component was responsible for 90.1% (see Table Four).

British Columbia's growth rate during the 1960's was marginally below the national average. Its growth performance was the result of a strong positive competitive component (194.0% of net relative change) offset by an even stronger negative industry mix component (-294.0%; see Table Two). The specialization ratios indicate that British Columbia is fairly specialized in its industry mix (see Table Three) although it did have at least some representation in most of the industrial groupings. Therefore, it would appear that in the 1960's British Columbia was competing well in a few industries that were not particularly strong growth industries. Unlike the situation in the other provinces, however, the situation in British Columbia changes drastically in the period 1969 to 1973. British Columbia grew by 15.4% for a positive net relative growth of 10.9 percentage points. This strong growth was due to both a good industry mix effect and a good competitive effects component (+36.0% and 64.0% of net relative growth respectively). In other words, during the 1969 to 1973 British Columbia still competed strongly in a few industries (its specialization ratios remained high) but these few industries had become growth industries (see Table Four).

During the 1961 to 1969 period the structure of Alberta's manufacturing sector was fairly specialized (high values for its specialization measures) with a poor mix of growth and non-growth industries and this resulted in a poor industry mix performance. However, its competitiveness in the industries it did have was strong enough to over-power the poor industry mix to result in a high over-all growth rate of 31.2%, 7.3 percentage points above the national growth rate. During the 1969 to 1973 period, the shift in the relative growth rates of industries at the national level favoured Alberta's industry mix. Not only was Alberta's competitiveness contributing to its growth (the primary force) but now the industry mix effect had changed from an inhibiting factor to a moderate positive factor (see Table Four).

In the 1960's, Saskatchewan was the slowest growing province (12.6% or a net relative growth of 11.2 percentage points). Nothing appeared to favour growth for this province. It was specialized (high values for the specialization measures and a small number of industrial groups in existence) in slow growth industries (a large negative industry mix component) and was not competing well in these industries (a negative competitive component). During the 1969 to 1973 period Saskatchewan's fortunes seem to have reversed. It had a strong rate of growth (9.7% compared to the national rate of 4.5%). However, the shift-share analysis based upon limited coverage found a negative relative growth due to both a negative industry mix effect component and a negative competitive effects component (see Table Four). One can only surmise what these facts indicate. It would appear that the eleven groups for which data was available continued to perform badly but the industries for which no data are published displayed strong growth. It is possible that these strong growth industries are the same ones that influenced positively the growth rates in Alberta and British Columbia (see above, p.190). This rationale is supported by two facts. First, the value of the Pietra Ratio fell during this period (indicating a decrease in specialization). Second, the actual negative net relative change for 1961 to 1969 was smaller than the estimated negative net relative change (see Table Two). This indicates that the industries that were not included in the estimated value had a positive influence on growth. Therefore, it would be logical to argue that these positive influences grew in strength during the 1969 to 1973 period.

Finally, there is Manitoba's performance. During the 1961-1969 period Manitoba grew by only 18.1% or 5.7 percentage points below the national average. Its poor industry mix accounted for 80% of this poor performance while its poor competitive position accounted for the remaining 20%. Although Manitoba apparently had establishments in only 16 of the possible 20 industrial groupings within its borders, its manufacturing structure was the most diversified next to Ontario and Quebec. The negative industry mix component indicates that it could nevertheless have had a better mix of growth versus non-growth industries. During the 1969-1973 period, its relative performance improved. Its employment increased by 6.6%, 2.1 percentage points above the national average. This performance appears to have been due to an improvement in its competitive position since the industry mix component continued to exert downward pressure on the provincial growth rate. Its industrial structure, as measured by the specialization ratios, remained about the same. Therefore, the conclusion inherent in the data must be that the improved performance of Manitoba was for reasons different from the improved performance of the other western provinces. The change in the relative growth rates of the various industries at the national level did not help Manitoba (the industry mix component is still negative). Instead, for some reason, the province improved its competitiveness within the industries it already had.

ii) Structure and Growth of Manufacturing Employment by Industry

At the national level there were three manufacturing groups that were large and fast growing in terms of employment during the 1961 to 1969 period. (A manufacturing group was defined as large in Canada and Manitoba if in 1961 it accounted for approximately 5% of total manufacturing employment in Canada and Manitoba respectively. A manufacturing group was defined as a fast growth group if it grew faster than the national average for the period considered*.) Of these three, only two (Metal Fabricating Industries and Transportation

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*When the growth of the group is measured in terms of value added (underflated) its performace in Canada and Manitoba is just as good. It ranked sixth (7.2%) and fourth (8.1%) in relative size in Canada for the years 1961 and 1969. It ranked fifth in employment growth in the nation and is increase in value added was the third largest in Manitoba; this group in Manitoba ranked third in size (8.0%) and second (9.7%) in 1961 and 1969 respectively. It was the fifth fastest growing group in the province and ranked second in terms of increased value added (undeflated).

Equipment Industries) were also large and fast growing in Manitoba. The third group (Electrical Products Industries) was small and fast growing in Manitoba. The Machinery Industries group was the fastest growing group in both Canada and Manitoba. Although this group was classified as a small group in 1961, by 1965 it was a large employer in both the nation and the province. The only other fast growth industry group in Manitoba was Textiles; this group accounted for only a small portion of Manitoba's total employment and at the national level was a small slow growth industry. At the national level, two other small groups were also fast growth. (Furniture and Fixtures Group and the Miscellaneous Manufacturing Group.) Both groups were small and slow growing in Manitoba (see Tables Five and Six). Based solely upon their performance in the 1960's in terms of growth these seven groups of industries appear to have the most potential for growth (see Table Seven - the first seven entries).

The next three groups with the greatest growth potential based upon national performance are the Primary Metals Group, the Paper Products Group and the Chemical Products Group. None of these three did particularly well in Manitoba however. The Primary Metals Group was larger in the province but recorded a slow growth rate. The other two (Paper Products and Chemical Products) were both small and grew slowly during the period. These groups deserve closer examination as one would expect, a priori, that Manitoba would have performed better in these groups with the possible exception of the Chemical Group.

The Food and Beverage Group was the largest employer in both Canada and Manitoba and grew slowly in both jurisdictions. This group was relatively larger in Manitoba than in Canada (which is not surprising) but it grew more slowly in Manitoba than in Canada (which is surprising). Clothing, on the other hand, was a large and slow growing group but it was relatively larger and grew more quickly in Manitoba than in Canada. (See Table Seven for a summary of the comments made to this point in this section of the paper.)

TABLE FIVE: CANADA: MANUFACTURING INDUSTRIAL EMPLOYMENT GROUP LEVEL 1961 - 1969

	RELATIVE SIZE						RELATIVE GROWTH						ABSOLUTE GROWTH					
	Percentage			Rank			Percentage			Rank			Change in Employment			Rank		
Large and Fast Growth	1961	1965	1969	1961	1965	1969	1961/65	1965/69	1961/69	1961/65	1965/69	1961/69	1961/65	1965/69	1961/69	1961/65	1965/69	1961/69
1. Metal Fabricating	7.5	8.5	8.4	2	3	3	32.6	5.5	39.9	3	10	5	32,938	7,425	40,363	2	7	2
2. Transport. Equip.	7.3	8.6	9.4	3	2	2	36.5	16.4	58.9	2	2	2	36,201	22,274	58,475	1	1	1
3. Electrical Prod.	6.6	7.2	7.6	7	4	4	27.0	11.9	42.1	4	4	4	24,103	13,523	37,626	3	3	3
Large and Average Grow																		
1. Paper Products	7.3	7.0	7.3	4	5	5	12.1	10.6	24.0	11	5	7	11,888	11,697	23,585	6	4	6
2. Primary Metal Prod	6.7	6.8	6.6	6	6	6	19.5	3.2	23.4	7	11	9	17,548	3,449	20,997	5	10	7
3. Chemical Products	4.7	4.5	4.7	11	11	11	12.0	10.5	23.8	12	6	8	7,618	7,466	15,084	12	6	8
Large and Slow Growth																		
1. Food and Beverage	15.6	14.1	13.4	1	1	1	4.7	1.5	6.3	16	13	16	9,938	3,411	13,349	8	11	9
2. Clothing	6.9	6.3	5.9	5	7	7	5.7	0.4	6.3	15	16	17	5,353	432	5,785	14	16	15
3.+ Wood Products	6.1	5.8	5.5	8	8	8	11.6	1.0	12.7	13	15	13	9,504	935	10,439	10	13	11
4. Printing & Publ.	5.6	5.0	5.1	9	9	9	4.7	7.5	12.6	17	9	14	3,544	5,917	9.461	16	8	13
5. Textiles	4.8	4.9	4.5	10	10	13	18.0	-1.7	16.0	10	17	11	11,707	-1,325	10,382	7	19	12
Small and Fast Growth																		
1. Misc. Industries	3.9	4.0	4.6	12	13	12	18.2	23.7	46.2	9	1	3	9,646	14,828	24,474	9	2	5
2. Machinery Ind.	3.7	4.5	4.9	13	12	10	39.2	15.7	61.4	1	3	1	20,044	11,064	31,108	4	5	4
3.+ Furniture & Fix.	2.5	2.6	2.6	15	15	15	20.6	9.6	32.2	5	7	6	6,899	3,874	10,773	13	9	10
Small and Average Grow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small & Slow Growth																		
1. Non-Metallic Min. Prod.	3.2	3.3	3.1	14	14	14	18.2	1.3	19.8	8	14	10	7,898	670	8,568	11	14	14
2. Leather Products	2.5	2.1	1.9	16	16	16	-2.1	-4.2	-6.3	19	20	20	-698	-1,393	-2,091	19	20	20
3. Knitting	1.8	1.5	1.5	17	18	18	6.1	2.6	8.9	14	12	15	1,379	634	-2,013	17	15	17
4. Rubber Products	1.6	1.7	1.5	18	17	17	20.1	-3.6	15.8	6	19	12	4,385	-947	3,438	15	18	16
5. Petro & Coal Prod.	1.2	0.9	0.9	19	19	19	-12.6	9.1	-4.6	20	8	19	-2,062	1,303	-759	20	12	19
6. Tobacco & Tob. Prod	0.8	0.7	0.6	20	20	20	-1.3	-2.0	-3.3	18	18	18	-139	-204	-343	18	17	18
TOTAL	100.0	100.0	100.0	-	-	-	16.1	6.7	23.8				217,694	105,033	322,727			
+ Wood and Furniture	8.5		8.1	-	-	-												
++ Metals	17.9		19.9	-	-	-												

Source: EDAB Shift-Share Analysis, October 1975

TABLE SIX: MANITOBA: MANUFACTURING EMPLOYMENT AND GROUP LEVEL 1961-1969

	Relative Size						Relative Growth						Absolute Growth					
	Percentage			Rank			Percentage			Rank			Change in Employment			Rank		
	1961	1965	1969	1961	1965	1969	1961/65	1965/69	1961/69	1961/65	1965/69	1961/69	1961/65	1965/69	1961/69	1961/65	1965/69	1961/69
Large and Fast Growth																		
1. Metal Fabricating	8.0	9.2	9.8	4	3	3	28.2	13.7	45.7	3	5	3	941	384	1,525	2	3	3
2. Transport. Equip.	5.1	5.9	9.1	6	5	4	26.2	65.1	108.4	4	1	2	564	1,770	2,334	4	1	1
Large and Stagnant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Large and Slow Grow.																		
1. Food and Bev.	26.5	25.2	22.7	1	1	1	5.4	-4.1	1.1	12	18	15	599	-480	119	3	16	14
2. Clothing	14.2	13.8	12.9	2	2	2	7.2	0.3	7.5	10	11	10	428	16	444	5	11	5
3. Printing & Publ.	9.4	8.5	8.3	3	4	5	0.3	4.4	4.8	14	9	14	13	175	188	14	5	7
4. Primary Metal Prod	6.0	5.7	5.4	5	6	7	5.4	1.4	6.8	13	10	13	135	36	171	10	10	9
Small and Fast Growth																		
1. Electrical Prod.	2.7	2.9	3.2	11	11	10	18.3	17.5	39.0	5	3	4	211	238	449	6	4	4
2. Machinery	3.3	5.1	6.2	10	7	6	72.2	29.2	122.6	1	2	1	998	696	1,694	1	2	2
3. Textiles	1.3	1.4	1.5	16	16	16	15.8	13.5	31.5	6	6	5	87	86	173	12	8	8
Small and Stagnant																		
1. Leather	1.4	1.7	1.5	15	15	15	30.6	-6.3	22.3	2	18	6	185	-50	135	7	13	11
Small and Slowth Grow.																		
1. Furniture and Fix.	4.3	4.3	3.9	7	8	8	9.0	-1.8	7.0	9	15	12	163	-35	128	8	12	13
2. Paper Products	3.9	3.8	3.8	8	9	9	9.0	6.1	15.7	8	8	7	146	108	254	9	7	6
3. Non-Met. Min. Prod	3.7	3.3	3.0	9	10	11	-0.9	-3.6	-4.4	15	16	16	-14	-54	-68	17	15	16
4. Misc. Manufact	2.7	2.7	2.4	12	12	13	11.7	-4.1	7.1	7	17	11	132	-52	80	11	14	15
5. Wood Products	2.6	2.5	2.5	13	13	12	5.9	7.5	13.8	11	7	9	64	86	150	13	9	10
6. Chemical Products	2.0	1.8	2.0	14	14	14	-0.9	16.8	15.7	16	4	8	-8	140	132	16	6	12
Others																		
1. Tobacco & Tob.Prod	0.1	0.6	-	18	18	-	-1.6	-	-	17	-	-	-1	-	-	15	-	-
2. Rubber Products	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Knitting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Petro & Coal Prod.	1.7	0.9	-	15	17	-	-40.6	-	-	18	-	-	-282	-	-	18	-	-
Total in Manitoba	-	-	-	-	-	-	10.8	6.6	18.1	-	-	-	4,312	3,071	7,583	-	-	-

+Wood and Fur.
++ Metals

Source: EDAB Shift-Share Analysis, Oct. 1975.

TABLE SEVEN: MANUFACTURING GROUP PERFORMANCE 1961-1969

SUMMARY OF TABLES FIVE AND SIX

	GROUP	CANADA	MANITOBA	COMMENTS
1.	Metal Fabricating Ind.	Large and Fast Growth	Large and Fast Growth	
2.	Transportation Equip.	Large and Fast Growth	Large and Fast Growth	
3.	Electrical Prod. Ind.	Large and Fast Growth	Small and Fast Growth	
4.	Machinery Industries	Small and Fast Growth	Small and Fast Growth	Fastest Growing in Canada and Manitoba
5.	Textiles	Small and Slow Growth	Small and Fast Growth	
6.	Furniture & Fixtures	Small and Fast Growth	Small and Slow Growth	
7.	Misc. Manufacturing	Small and Fast Growth	Small and Slow Growth	
8.	Primary Metal Products	Large and Av. Growth	Large and Slow Growth	
9.	Paper Products	Large and Av. Growth	Small and Slow Growth	
10.	Chemical Products	Large and Av. Growth	Small and Slow Growth	
11.	Food and Bev. Prod.	Large and Slow Growth	Large and Slow Growth	Largest employer in Can. & Man. Manitoba relatively larger & relatively slower
12.	Clothing Industries	Large and Slow Growth	Large and Slow Growth	Man. relatively larger and relatively faster
13.	Wood Products	Large and Slow Growth	Small and Slow Growth	Man. growing relatively faster
14.	Printing and Publish.	Large and Slow Growth	Large and Slow Growth	Man. growing relatively slower
15.	Leather Products	Small and Slow Growth	Small and Av. Growth	
16.	Non-Metallic Min. Prod.	Small and Slow Growth	Small and Slow Growth	
17.	Knitting Products	Small and Slow Growth	Unknown	
18.	Rubber Products	Small and Slow Growth	Non-existent	
19.	Petroleum and Coal Prod.	Small and Slow Growth	Unknown	
20.	Tobacco Products	Small and Slow Growth	Non-existent	

Source: EDAB Shift Share Analysis, October 1975

TABLE EIGHT: CANADA MANUFACTURING EMPLOYMENT, GROUP LEVEL, 1952 - 1959

	Relative Size						Relative Growth						Absolute Growth					
	Percentage			Rank			Percentage			Rank			Change in Employment			Rank		
	1952	1955	1959	1952	1955	1959	1952/55	1955/59	1952/59	1952/55	1955/59	1952/59	1952/55	1955/59	1952/59	1952/55	1955/59	1952/59
Large and Fast																		
1. Food and Beverage	13.6	13.9	14.7	2	2	2	2.6	6.7	9.4	10	4	7	4,533	12,007	16.540	5	1	1
2. Paper	6.4	6.9	7.2	6	5	5	8.2	5.0	13.6	4	8	5	6,785	4,481	11.266	3	4	3
3. Print. & Publ.	5.0	5.4	5.7	9	8	7	7.9	6.2	14.6	5	5	4	5,117	4,324	9,441	4	6	4
4. Elec. Prods.	5.4	5.9	5.7	8	7	8	10.2	-1.1	6.8	2	13	8	7,044	-2,361	4,683	2	15	7
Large & Av. Growth																		
1. Iron and Steel	14.7	14.0	14.8	1	1	1	-4.0	6.2	2.0	13	6	10	-7,491	11,269	3,778	16	2	8
Large & Slow																		
1. Textiles	5.6	5.1	4.9	7	9	9	-4.9	-8.3	-12.6	15	17	16	-3,595	-5,565	-9,160	15	16	15
2. Clothing	9.1	6.9	6.7	5	6	6	-23.8	-2.2	-25.5	18	10	18	-27,962	-2,032	-29,990	18	14	17
3. Wood	10.1	10.3	9.5	4	3	3	2.5	-7.4	- 5.1	11	16	14	3,205	-9,682	-6,677	7	17	15
4. Transp. Equip.	11.6	10.2	8.7	3	4	4	-10.0	-13.8	-22.4	17	18	17	-14,571	-18,183	-32,754	17	18	18
Small and Fast																		
1. Tobacco	0.7	0.7	0.8	18	18	18	2.7	8.0	15.9	9	3	6	252	758	1.010	12	8	10
2. Non-Ferr. Metal	4.0	4.1	4.0	10	10	11	4.7	-2.4	2.1	7	11	9	2,373	-1,286	1,087	8	13	9
3. Non-Met.Mins.	2.4	3.0	3.3	13	12	12	24.0	11.3	38.0	1	1	1	7,527	4,400	11.927	1	5	2
4. Chemicals	3.7	4.0	4.2	11	11	10	8.7	5.6	14.0	3	7	3	4,162	2,926	7,088	6	7	6
5. Misc. Mfg.	2.3	2.4	2.9	14	13	13	5.6	20.2	27.0	6	2	2	1,678	6,375	8,053	9	3	5
Small & Av. Growth																		
-																		
Small & Slow																		
1. Rubber Prods.	1.7	1.7	1.6	16	15	15	1.5	-3.7	-2.3	12	14	12	331	-820	489	11	12	12
2. Leather Prods.	2.5	2.4	2.4	12	14	14	-4.8	1.4	-3.4	14	9	13	1,328	437	1,091	13	9	13
3. Knitting Mills	1.8	1.7	1.6	15	16	16	-8.8	-3.1	-9.7	16	12	15	-1,576	-666	-2,242	14	10	14
4. Petrol & Coal	1.3	1.3	1.3	17	17	17	3.4	-4.1	-0.8	9	15	11	581	-711	-130	10	11	11

Source: IDAB Shift Share Analysis, October 1975

TABLE NINE: MANITOBA MANUFACTURING EMPLOYMENT, GROUP LEVEL, 1952 - 1959

	Relative Size						Relative Growth						Absolute Growth					
	Percentage			Rank			Percentage			Rank			Change in Employment			Rank		
	1952	1955	1959	1952	1955	1959	1952/55	1955/59	1952/59	1952/55	1955/59	1952/59	1952/55	1955/59	1952/59	1952/55	1955/59	1952/59
Large and Fast																		
1. Food and Beverage	22.9	23.5	23.6	1	1	1	-2.5	4.8	2.2	9	2	7	248	470	222	13	2	4
2. Iron and Steel	12.1	11.9	14.2	4	4	2	-5.8	24.1	16.9	11	4	5	596	1131	885	14	1	1
Large and Av. Growth																		
	—		—															
Large and Slow																		
1. Clothing	14.5	14.0	13.2	3	3	4	7.9	- 1.3	-9.1	13	12	11	498	-112	-610	15	14	14
2. Wood	7.7	7.6	7.7	6	6	6	5.9	3.4	-0.8	12	6	10	198	170	28	11	4	9
3. Print. & Publ.	8.9	9.0	8.9	5	5	5	-3.4	2.8	-0.7	10	9	9	-131	103	28	9	6	9
4. Transp. Equip.	17.9	15.0	13.6	2	2	3	-20.2	- 5.4	-24.6	14	13	14	1570	334	1904	16	16	15
Small and Fast																		
1. Paper	3.1	3.6	3.6	7	7	8	9.2	4.4	14.1	5	8	6	126	66	192	4	7	6
2. Elec. Products	1.6	2.1	2.1	12	9	9	24.7	2.4	27.8	3	10	4	173	21	194	3	10	5
3. Non-Metallic Mins.	2.0	2.9	3.9	8	8	7	42.5	18.0	96.7	1	2	1	362	461	823	1	3	2
4. Petroleum Prods.	1.3	1.9	1.7	15	11	12	41.8	-8.8	29.3	2	14	3	231	-69	162	2	12	7
5. Misc. Manufact.	1.3	1.6	2.0	14	14	10	20.4	24.1	49.6	4	3	2	115	165	280	5	5	3
Small and Av. Growth																		
1. Chemicals	1.7	1.8	1.7	10	12	11	2.3	-0.4	1.9	7	11	8	17	- 3	14	7	11	8
Small and Slow																		
1. Leather	1.7	1.7	1.4	11	13	13	-2.0	-11.9	-13.7	8	15	12	14	84	-98	8	13	11
2. Textiles	1.8	2.0	1.2	9	10	15	3.9	38.4	-36.0	6	16	15	31	314	-283	6	15	13
3. Knitting Mills	0.5	0.2	0.1	16	16	16	-68.2	73.5	-44.9	16	1	16	146	30	96	10	9	10
4. Non-Ferrous Met.	1.6	1.1	1.2	13	15	14	31.7	12.2	-23.3	15	5	13	216	57	159	12	8	12
Others																		
1. Tobacco	—	—																
2. Rubber	—	—	—															

Source: EDAB, Shift-Share Analysis October 1975

TABLE TEN: CANADA: MANUFACTURING EMPLOYMENT

GROUP LEVEL, 1969-73

	Relative Size				Relative Growth		Absolute Growth	
	Percent		Rank		1969-73 %	1969-73 Rank	1969-73 In Emply.	1969-73 Rank
	1969	1973	1969	1973				
Large & Fast Growth								
1. Transp. Equip.	9.4	9.9	2	2	9.9	3	15,603	2
2. Clothing	5.9	6.0	7	8	5.3	7	5,209	7
3. Wood	5.5	6.4	8	7	20.6	1	19,076	1
4. Print. & Publishing	5.1	5.2	9	9	7.0	6	5,939	4
Large and Average Growth								
1. Primary Metal	6.6	6.7	6	6	5.0	8	5,509	5
Large and Slow Growth								
1. Metal Fabricating	8.4	8.3	3	3	2.5	11	3,504	10
2. Food and Beverages	13.4	12.7	1	1	-0.7	15	-1,599	19
3. Electrical Products	7.6	7.3	4	4	0.7	13	942	14
4. Paper	7.3	7.0	5	5	1.0	12	1,261	12
Small and Fast Growth								
1. Textiles	4.5	4.6	13	12	7.0	6	5,291	6
2. Furniture	2.6	2.8	15	15	10.9	2	4,803	8
3. Non-Metallic Min.	3.1	3.2	14	14	7.8	5	4,061	9
4. Misc. Manufacturing	4.6	4.9	12	10	9.8	4	7,558	3
5. Rubber	1.5	1.6	17	16	10.9	2	2,755	11
Small and Average								
1. Knitting	1.5	1.5	18	17	4.8	9	1,175	13
Small and Slow								
1. Machinery	4.9	4.7	10	11	-0.1	14	- 107	16
2. Leather	1.9	1.6	16	16	-12.6	18	3,941	20
3. Chemicals	4.7	4.4	11	13	- 1.4	16	-1,113	18
4. Tobacco	0.6	0.5	20	19	- 6.4	17	- 646	17
5. Petroleum	0.9	0.9	19	18	2.9	10	454	15
Total					+ 4.5			

Source: EDAB Shift-Share Analysis, October 1975
Statistics Canada #31-203, 1973

TABLE ELEVEN: MANITOBA MANUFACTURING EMPLOYMENT:
GROUP LEVEL 1969 - 1973

	Relative Size				Relative Growth		Absolute Growth	
	Percent		Rank					
	1969	1973	1969	1973	1969-73 %	1969-73 Rank	1969-73 in Employ.	1969-73 Rank
Large and Fast Growth								
1. Clothing	12.9	14.4	2	2	18.9	3	1,209	1
2. Transp. Equipment	9.1	10.6	4	3	24.0	2	1,075	2
3. Machinery	6.2	6.8	6	6	16.1	5	494	4
4. Primary Metal	5.4	5.4	7	7	6.4	6	171	6
Large and Average Growth								
-	-	-						
Large and Slow								
1. Food and Beverages	22.7	20.8	1	1	-2.3	11	-260	14
2. Metal Fabricating	9.8	8.2	3	4	-10.8	15	-527	15
3. Printing and Publish	8.3	7.7	5	5	-1.6	10	- 66	11
Small and Fast								
1. Paper	3.8	4.1	9	8	16.7	4	313	5
2. Wood	2.5	3.7	12	10	57.2	1	707	3
3 Furniture	3.9	3.9	8	9	5.2	7	101	7
Small and Average Growth								
-	-	-						
Small and Slow								
1. Electrical Products	3.2	3.1	10	11	1.8	9	29	8
2 Non-Metallic Mins.	3.0	2.5	11	12	-8.6	13	-125	13
3. Chemicals	2.0	1.7	14	13	-10.7	14	-104	12
4. Leather	1.5	1.3	15	15	-6.5	12	- 48	10
5. Textiles	1.5	1.4	16	14	3.5	8	25	9
Others								
1. Misc. Manufacturing	2.4	-	13	-	-	-	-	-
2. Tobacco	-	-	-	-	-	-	-	-
3. Rubber	-	-	-	-	-	-	-	-
4. Knitting	-	0.7	-	16	-	-	-	-
5. Petroleum	-	-	-	-	-	-	-	-
Total					6.6			

Source: EDAB Shift Share Analysis, October 1975
Statistics Canada #31-203, 1973.

II Industry Level Analysis

In the Standard Industrial Classification system (SIC) used by the government each of the twenty groups are disaggregated into several smaller industries; these smaller industries are often referred to as 3 digit level industries. (The group level of aggregation is the two digit level; in some cases there is a further disaggregated to a four digit level.) This section of the paper will review the three digit industries on a group by group basis. Although such a review will give us a more accurate view of growth trends the findings can still only be considered preliminary. The identification of potential growth (or non-growth) industries will require more information than merely employment trends. A development strategy, the ultimate aim of research such as this, will require more information than the identification of potential growth industries.

Although it is possible to analyze all twenty industrial groupings, this paper will report on only two groups identified in the previous section as having some potential in Manitoba. However, the results of the shift-share analysis for all the industries at the group level can be found in Tables Twelve, Thirteen and Fourteen and the relevant data for the other three-digit industries will be found in the appendices. The two groups to be analyzed are i) The Metal Fabricating Industries and ii) The Transportation Equipment Industries.

i) Metal Fabricating Industries

As already discussed, (see above p.192)this group of industries was a large fast growth group during the 1960's; it also showed strong growth in the 1950's. This group of industries did not exist as a classification prior to 1960. Consequently it is difficult to place its growth performance in the 1960's in a longer term time perspective. However, the industries assigned to this group in 1960 grew collectively at a rate well above the national growth rate during the 1950's.

According to our statistics, a slow-down in the employment growth rate actually occurred around 1965 and was in line with the slow-down in manufacturing activity in general. At the national level, employment in manufacturing grew by 16.1% during the period 1961 to 1965; during the same period the Metal

Fabricating Industries grew twice as fast (32.6%). During the 1965 to 1969 period, the manufacturing growth fell to 6.7% and Metal Fabricating dropped drastically to 5.5%. From 1969 to 1973 the recession continued with manufacturing declining to 4.5% and Metal Fabricating falling to 2.5%.

In contrast, manufacturing employment growth remained remarkably stable in Manitoba. It grew by 10.8%, 6.6% and 6.6% during the periods 1961 to 1965, 1965 to 1969 and 1969 to 1973 respectively. The same cannot be said for the Metal Fabricating Industries in Manitoba. During the period 1961 to 1965 its growth was an impressive 28.2% but was nevertheless below the national growth rate for this group of industries nationally (32.6%). From 1965 to 1969, the growth of this group fell to 13.7% which although drastic was mild compared to the drop at the national level (5.5%). However, in the 1969 to 1973 period while the Metal Fabricating group dropped slightly to 2.5% at the national level, the group actually contracted in Manitoba; its growth rate was minus 10.8%.

The implications are clear. First, compared even to the economic cycles of the manufacturing sector at the national level this group of industries is unstable. Second, for this group of industries, at least, Manitoba appears to function as a hinterland. Manitoba acts as a cushion in the sense that in boom periods the province picks up the excess demand and in recessionary periods the incidence of the reduced demand falls heavily on Manitoba. During the expansionary period of the early 1960's, the Metal Fabricating Industries are doing very well nationally (32.6%) and also in Manitoba but at a slightly lower rate of growth (28.2%). When the recession hits, this group's national growth drops sharply (5.5%) but in Manitoba although its growth drops in this industry it does not drop as drastically (13.8%). However, as the recession continues and the growth of the industry at the national level drops again to 2.5% during the 1969 to 1973 period, within Manitoba the group actually declines by 10.8%. In contrast, the growth of this group of industries in Ontario remains remarkably close to the national rate (32.6%, 6.4% and 2.7% during the periods 1961 to 1965, 1965 to 1969 and 1969 to 1973 respectively). This second implication - 'the cushion effect' of the hinterland - would be an interesting hypothesis to pursue in an intensive industry study of this group. (There is another possible explanation for these trends, see below p.207)

One theoretical rationale for the 'cushion effect' characteristic of a hinterland economy is as follows. The major suppliers within an industry or group of industries are located in the heartland. During a recessionary period, orders that would normally be placed with suppliers in the hinterland are re-directed to the suppliers in the heartland. On the other hand, during a period of expansion orders that would normally be placed with suppliers in the heartland are re-directed to the hinterland but only after the heartland suppliers are operating at capacity. In other words and for whatever reasons, the changes in the level of demand are met in the short run by altering the level of production in the hinterland while the level of production in the heartland remains relatively immune to the vagaries of demand. A corollory of this argument would be that during an expansionary period, the heartland would expand its capacity at a prudent rate. This rationale for the 'cushion effect' is consistent with the trends discussed in the previous paragraph.

There is another way to test for the'cushion effect'. For any industry, like the industries in the Metal Fabricating Group, where the cyclical pattern has wider amplitudes than the over-all manufacturing cycle, one would expect in shift-share analysis that the industry mix component in the hinterland and the heartland to be positive in an expansionary economy and negative in a recessionary economy. One would also expect the competitive effects component to be positive in an expansionary period and negative in a recessionary period for a hinterland economy and the opposite results for a heartland economy.

When this hypothesis was tested the signs for the industry mix component (positive or negative) were in accordance with the hypothesis (that is the industry nationally grew at a rate that was greater than the average national manufacturing rate during an expansionary period and vice-versa during a recessionary period). However, the signs of the competitive effects component,(CEC) were not as predicted by the theory. For instance, the CEC for Manitoba during the expansionary period 1961 to 1965 was negative and it should have been positive; during the recessionary period of 1965 to 1969 the sign of the CEC was positive and it should have been negative; the sign was appropriately negative during the recessionary period of 1969 to 1973. The theory predicted better for Ontario. Its CEC sign during the 1961 to 1969 period was positive but only marginally so when it should have been negative; its CEC sign was appropriately positive during

TABLE TWELVE: MANITOBA SHIFT-SHARE ANALYSIS, MANUFACTURING EMPLOYMENT BY GROUPS, 1952 - 1959

Manufacturing Group	Growth		Shift-Share Analysis					Man.'s Share of Industry (& Rank)	Man.'s Share of Industry (& Rank)
	1952-59 (%)	Net Relative Growth (Percentage Points)	Net Relative Growth	Indust. Mix	Comp. Effects	I.M. / N.R.G (%)	C.E. / N.R.G. (%)	1952	1959
+++:									
Paper Products	14.1	12.9	+176	+169	+7	+ 96.0	+ 4.0	1.6% (7)	1.7% (6)
Iron and Steel	16.9	15.7	+822	+ 41	+780	+ 5.0	+ 94.9	2.8 (5)	3.2 (4)
Electrical App.	27.8	26.5	+186	+ 39	+147	+ 21.0	+ 79.0	1.0 (3)	1.2 (4)
Non-metallic mins.	96.7	95.5	+813	+313	+500	+ 38.5	+ 61.5	2.7 (5)	3.9 (5)
Miscellaneous	49.6	48.3	+273	+146	+127	+ 53.5	+ 46.5	1.9 (5)	2.2 (5)
+-+:									
Petroleum and Coal	29.3	28.1	+155	- 10	+166	- 6.5	- 107.1	3.3 (6)	4.3 (6)
++-:									
Chemicals	1.9	0.7	+ 5	+ 99	- 94	+ 1980.0	-1880.0	1.5 (4)	1.4 (5)
Foods and Beverages	2.2	1.0	+102	+816	-714	+ 800.0	- 700.0	5.7 (5)	5.3 (5)
-+-:									
Printing & Publ.	-0.7	-1.9	- 74	+518	-592	+ 700.0	- 800.0	6.0 (4)	5.2 (4)
Non-ferrous metal	-23.3	-24.5	-166	+ 6	-173	+ 3.6	- 104.2	1.3 (4)	1.0 (5)
--+:									
Clothing	- 9.7	-10.9	-685	-1680	+995	- 245.3	+ 145.3	5.4 (3)	6.5 (3)
Wood	- 0.8	- 2.0	- 67	- 210	+142	- 313.4	+ 211.9	2.6 (7)	2.7 (6)
---:									
Leather	-13.7	-14.9	-106	- 32	- 73	- 30.2	- 68.9	2.2 (3)	2.0 (3)
Textiles	-36.0	-37.2	-292	- 108	-183	- 37.0	- 62.7	1.1 (4)	0.8 (4)
Knitting Mills	-44.9	-46.1	- 98	- 22	- 74	- 22.4	- 75.5	0.9 (4)	0.6 (5)
Transp. Equip.	-24.6	-25.8	-1997	-1828	-168	- 91.5	- 9.2	5.3 (3)	5.1 (3)

Confidential: i) Tobacco Products
ii) Rubber Products

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE THIRTEEN: MANITOBA SHIFT-SHARE ANALYSIS, MANUFACTURING EMPLOYMENT BY GROUPS, 1961 - 1969

Manufacturing Group	Growth		Shift-Share Analysis					Man.'s Share of National Industry (& Rank) 1961	Man.'s Share of National Industry (& Rank) 1969
	1961-69 (%)	Net Relative Growth (Percentage Points)	Net Relative Growth	Industry Mix	Comp. Effects	I.M./N.R.G. (%)	C.E./N.R.G. (%)		
+++:									
Metal Fabricating	45.7	+21.9	+729	+536	+193	+73.5	+26.5	3.3%(5)	3.4%(5)
Machinery	122.6	+98.7	+1364	+519	+845	+38.0	+62.0	2.7 (4)	3.8 (4)
Transp. Equip.	108.4	+84.5	+1820	+755	+1065	+41.5	+58.5	2.2 (5)	2.8 (5)
+-+:									
Textiles	31.5	+ 7.6	+ 42	- 42	+ 85	-100.0	+202.4	0.8 (4)	1.0 (4)
++-:									
Electrical Prod.	39.0	+15.1	+174	+210	- 35	+120.7	-20.1	1.3 (4)	1.3 (5)
-+-:									
Furn. & Fixtures	7.0	-16.8	-305	+151	-456	+ 49.5	-149.5	5.4 (4)	4.4 (4)
Paper & Allied	15.7	- 8.1	-130	+ 2	-133	+ 1.5	-102.3	1.6 (5)	1.5 (5)
Chemicals	15.7	- 8.2	- 68	0	- 68	0	-100.0	1.3 (5)	1.2 (5)
Misc. Mfg.	7.1	-16.8	-188	+252	-439	+134.0	-233.5	2.1 (4)	1.6 (4)
--+:									
Leather	22.3	- 1.5	- 8	-181	+173	-2262.5	+2162.5	1.8 (3)	2.4 (3)
Clothing	7.5	-16.4	-975	-1050	75	-107.7	+ 7.7	6.4 (3)	6.5 (3)
Wood	13.8	-10.0	-108	-120	12	-111.1	+ 11.1	1.3 (7)	1.3 (7)
---:									
Food & Beverage	1.1	-22.8	-2524	-1941	-582	- 76.9	- 23.1	5.3 (5)	5.0 (5)
Printing & Publ.	4.8	-19.1	-750	-443	-306	- 59.1	- 40.8	5.2 (4)	4.9 (4)
Primary Metal	6.8	-17.1	-428	- 12	-415	- 2.8	- 97.0	2.8 (4)	2.4 (5)
Non-Metallic Mins.	-4.4	-28.3	-432	- 61	-369	- 14.1	- 85.4	3.5 (5)	2.8 (5)

Source: EDAB Shift-Share Analysis, Oct. 1975

Confidential i) Tobacco Products

ii) Rubber

iii) Knitting Mills

iv) Petroleum and Coal

TABLE FOURTEEN: MANITOBA SHIFT-SHARE ANALYSIS, MANUFACTURING EMPLOYMENT BY GROUP, 1969 - 1973

Manufacturing Group	Growth		Shift-Share Analysis					Man.'s Share of National Industry	Man.'s Share of National Industry
	1969-73 (%)	Net Relative Growth (Percentage Points)	Net Relative Growth	Industry Mix	Comp. Effects	I.M. N.R.G. (%)	C.E. N.R.G. (%)	1969	1973
+++:									
Clothing	18.9	14.4	+921	+51	+870	+5.5	+94.5	6.5%(3)	7.3%(3)
Wood	57.2	52.7	+651	+199	+452	+30.6	+69.4	1.3 (7)	1.7 (7)
Primary Metal	6.4	1.9	+ 51	+13	+38	+25.5	+74.5	2.4 (5)	2.5 (4)
Transp. Equip.	24.0	19.5	+875	+242	+633	+27.7	+72.3	2.8 (5)	3.2 (4)
+-+:									
Paper	16.7	12.2	+228	-65	+293	-28.5	+128.5	1.5 (5)	1.8 (6)
Machinery	16.1	11.6	+357	-141	+498	+39.5	+139.5	3.8 (4)	4.4 (4)
++-:									
Furniture	5.2	0.7	+ 14	+125	-111	+892.9	-792.9	4.4 (4)	4.2 (3)
-+-:									
Textiles	3.5	-1.0	- 7	+ 18	- 25	+257.1	-357.1	1.0 (4)	0.9 (5)
Printing & Publ.	-1.6	-6.1	-252	+103	-355	+ 40.9	-140.9	4.9 (4)	4.5 (4)
Non-Metallic Mins.	-8.6	-13.1	-192	+ 48	-240	+ 25.0	-125.0	2.8 (5)	2.4 (5)
--+:									
Leather	-6.5	-11.1	- 82	-127	+ 45	-154.9	+ 54.9	2.4 (3)	2.5 (3)
Elec. Products	+1.8	- 2.7	- 43	- 61	+ 18	-141.9	+ 41.9	1.3 (5)	1.3 (5)
---:									
Food & Beverages	-2.3	- 6.8	-761	-582	-179	- 76.5	- 23.5	5.0 (5)	4.9 (5)
Metal Fab.	-10.8	-15.3	-743	- 97	-646	- 13.1	- 86.9	3.4 (5)	3.0 (5)
Chemicals	-10.7	-15.3	-149	- 58	- 91	- 38.9	- 61.1	1.2 (5)	1.1 (5)

Confidential: i) Tobacco Products
ii) Rubber Products
iii) Petroleum and Coal Products
iv) Misc. Manufacturing
v) Knitting Mills

Source: EDAB Shift Share Analysis, Oct. 1975; Statistics Canada #31-203, "Manufacturing Industries of Canada: national and provincial areas, 1973" the 1965 to 1969 period. Therefore, unless there is some reason to explain why the orders can be re-directed only after some time lag the 'cushion effect' hypothesis does not seem to reflect reality in this group of industries.

An alternative hypothesis is that the markets for the products of this manufacturing group of industries are essentially regional and as a result it is not possible to transfer orders from the hinterland to the heartland and vice-versa. Therefore, the competitive effects component is nothing but a measure of the differential between the rate of growth of demand within the province compared to the average rate of growth of demand in all the provinces. In such a case, there is no way to predict what the sign of the CEC will be unless more is known about the customers of these industries.

The Metal Fabricating Group is made up of nine three digit SIC industries (see Table Fifteen). In terms of new jobs created, the three most important industries in this group to Manitoba are 'Fabricated Structural Metal', 'Ornamental and Architectual Metal', and 'Miscellaneous Metal Fabricating'. All three of these industries are large employers in Manitoba, grew at a good rate and were competitive within their own industries (strong positive competitive effects). Manitoba also had a large share of the national employment in each of these industries if the Manitoba average share of the nations total manufacturing employment is used as a benchmark. (The ratio of a region's share of a national industry divided by that region's share of total national manufacturing is often referred as the Location Quotient; how appropriate such a benchmark may be is debatable.)

The Heating Equipment Industry and the Machine Shops Industry were also relatively large employers that had a good share of their respective industries nationally and had grown at a respectable rate. However, the Heating Equipment Industry in Canada as a whole was not growing at the average national rate (negative industry mix component) and thus the good performance of this industry within Manitoba was due to its competitiveness. In other words, Manitoba was growing relatively quickly in a slow growth industry. The case is just the opposite for the Machine Shops Industry; Manitoba was growing relatively slowly (poor competitively) in a fast growth industry.

Finally, there was the Metal, Stamping, Pressing and Coating Industry. Judging from the statistics on employment growth, this large industry both provincially and nationally, was growing slowly in Manitoba and quickly in the

TABLE FIFTEEN: METAL FABRICATING INDUSTRIES GROUP #13
MANITOBA EMPLOYMENT, 1961 - 1969

SIC NO	INDUSTRY	SIZE IN MANITOBA		SIZE IN NATIONAL INDUSTRY		GROWTH		SHIFT-SHARE		
		1961	1969	1961	1969	1961 to 1969	1961 to 1969	NRC	I.M.	C.E.
				%	%	%	N			
301	Boiler & Plate Wks.	14*	17*	0.3	0.2	21.4	+ 3	0	+ 5	- 5
302	Fab. Structural Mtl.	765	1118	5.5	6.1	46.1	+353	+123	+15	+108
303	Ornamental Arch.Mtl	239	584	2.5	4.6	144.4	+345	+273	+11	+263
304	Metal Stamp. Press. & Coating	992	1139	5.3	3.7	14.8	+147	-150	+336	-486
305	Wire and Wire Prod.	43*	102*	0.4	0.6	137.2	+ 59	+ 46	5	41
306	Hardware, Tools & Cutlery	43*	86	0.5	0.6	100.0	+ 43	+ 30	16	14
307	Heating Equip.	246	401	5.0	7.9	63.0	+155	+ 81	- 67	+149
308	Machine Shops	416	532	5.1	3.7	21.9	+116	- 8	+201	-209
309	Misc. Metal Fab.	507	881	3.5	4.2	73.8	+374	+222	66	155

* Data estimated from Statistics Canada published data which, due to confidentiality requirements, was included more than the one industry.

Source: EDAB Shift-Share Analysis, October 1975 nation during the 1960's. Of all the industries in this group, this one merits closer analysis, for the province may be losing potential growth. (The other industries within this group, 301, 305 and 306 were small and due to the confidentiality of data their growth rates could only be estimated and consequently are not very reliable.)

Examination of the statistics in the Input-Output Table for Canada, 1961 (see The Input-Output Structure of the Canadian Economy, 1961 Statistics Canada, Publication No. 15-501 and 15-502, 1969) yields some additional insights.

First, all the industries in this grouping could be referred to as capital goods producers in the sense that the vast majority of their customers are other producers rather than final consumers. Second, the most important customer for these industries is the construction trade. Third, domestic production was approximately the same size as domestic demand and there was little exporting or importing (see Table Sixteen and Seventeen).

For instance, in the Fabricated Structural Metal Industry, intermediate demand accounted for 99% of total domestic demand and domestic production available for domestic markets (domestic production minus exports) was 90% of total domestic demand. The construction sector accounted for 80% of the intermediate demand ; 9% of the shipments went to other industries within its own group (Metal Fabricating Industries) of which 2.2% went to other establishments within its own industry; the remaining 11% was scattered amongst twenty-six industries of the 110 industries in the Input-Output Tables (see Table Seventeen).

The implications of these statistics are that i) the fortunes of these industries are tied very closely to the construction trade and to a lesser extent, to the investment decisions of other industries, and ii) the markets for the products of these industries are regional. This last implication was drawn from these factors a) the strong competitive effects component relative to the industry mix component b) the small amount of imports and exports c) the small amount of intra-industry shipments.

There are, however, some interesting deviations from these basic characteristics. For instance, the Metal Stamping, Pressing and Coating Industry (SIC #304), a fast growth industry in Canada but one which was growing slowly in Manitoba, was not as dependent upon the construction trade as were the other large

TABLE SIXTEEN: THE METAL FABRICATING GROUP OF INDUSTRIES

Structural Characteristics
of Apparent Demand and Supply

Industry	T.O.	-Ex	- ΔI	=TO$_d$	+ M	= TD$_d$	= I.D.	+ F.D.
Boiler and Plate Works	$79.5 (91.1%)	$-2.6 (3.0%)	$+1.1 (1.2%)	$78.0 (89.3%)	$+9.3 (10.7%)	$=87.3 (100.0%)	$=79.0 (90.5%)	$+8.3 (9.5%)
Fabricated Sheet Metal	223.4 (92.4%)	-4.7 -(1.9%)	-0.8 -(0.4%)	217.9 (90.1%)	+23.9 (9.9%)	=241.8 (100.0%)	=240.4 (99.4%)	+1.4 (0.6%)
Ornamental & Arch. Metal	111.3 (97.8%)	-0.5 -(0.4%)	-0.9 -(0.8%)	109.9 (96.6%)	+ 3.9 (3.4%)	=113.8 (100.0%)	=113.8 (100.0%)	+0.0 (0.0%)
Metal Stamp. Pressing and Coating	316.1 (85.4%)	-3.7 -(1.0%)	-4.3 (1.1%)	=308.1 (83.3%)	+ 61.9 (16.7%)	=370.0 (100.0%)	=330.9 (89.4%)	+39.1 (10.6%)
Wire & Wire Products	222.9 (80.8%)	-6.3 -(2.3%)	-1.1 -(0.4%)	=215.5 (78.1%)	+ 60.4 (21.9%)	=275.9 (100.0%)	=256.8 (93.1%)	+19.1 +(6.9%)
Hardware, Tools and Cutlery	114.9 (64.7%)	-10.6 -(6.0%)	-0.9 -(0.4%)	103.4 (58.3%)	+ 74.1 (41.7%)	=177.5 (100.0%)	=126.8 (71.4%)	+50.7 (28.6%)
Heating Equipment	92.2 (90.1%)	- 2.0 -(1.9%)	+0.7 +(0.7%)	90.9 (88.9%)	+ 11.4 (11.1%)	=102.3 (100.0%)	= 95.3 (93.2%)	+ 7.0 +(6.8%)
Other Metal Fabricating	318.7 (79.2%)	-12.9 (3.2%)	-0.5 (0.2%)	305.3 (75.9%)	+ 96.6 (24.1%)	=402.3 (100.0%)	=360.4 (89.6%)	41.9 (10.4%)

Legend:
T.O. ≡ Total domestic output
E.x. ≡ Exports
I. ≡ Change in inventory
T.O.$_d$ ≡ Total domestic output for the domestic market
M. ≡ Imports
T.D.$_d$ ≡ Total domestic demand
I.D. ≡ Intermediate demand
F.D. ≡ Final demand

Derived from Statistics Canada, The Input-Output Structure of the Canadian Economy, 1961, Volume II, Table 13.

Source: EDAB

industries within this group. It also had a relatively high percentage of its shipments going to other establishments in its industry and group. Also 40% of its shipments went to the 'Other' category in Table Seventeen. Finally, the level of imports as a percentage to its total domestic demand was relatively high compared to the other industries in the Group (see Table Sixteen).

The major explanation for these deviations from the norm, no doubt, is that the principle product of this industry is metal containers (the construction trade has no demand for this product). In 1961, this industry, shipped solid metal containers to 46 industries, including itself, (out of a possible 110). Major customers included were Food and Beverage industries (such as fruit and vegetable canners and dairy processors), which was a large slow growth group of industries in both Manitoba and Canada. During the 1961 to 1969 period, the Food and Beverage industries were relatively larger and growing relatively slower in Manitoba than in the rest of Canada. The fact that this industry had a large number of customers, had a relatively large amount of imports and had a relatively large amount of intra-industry shipments suggests that the markets for its products were at least national. The large amount of intra-industry shipments also leaves open the possibility that the establishments in Manitoba were not producing end products but were supplying semi-finished goods to establishments in the industry elsewhere in Canada. It also leaves open the possibility that the establishments are highly specialized and the specialized products are shipped to a central location for distribution to the ultimate customers. This last possibility, if true, is fertile ground for monopoly power. In short, three possible reasons for this industry's poor performance are, i) one of its major customers, the Food and Beverage industries was growing slowly especially in Manitoba, ii) its markets and hence its competition is at least national and not regional and iii) the head offices of the firms decided to cut-back on the level of production in Manitoba.

To conclude, of all the industries in this group, the Metal, Stamping, Pressing and Coating Industry is the one which based upon the analysis of this paper, merits further intensive study. Second in priority for study would be the Wire and Wire Products Industry and the Hardware, Tools and Cutlery Industry. Both of these industries are relatively large in Canada, show good growth performance (see Table Fifteen), probably have at least a national if not an international market and yet are small in Manitoba.

TABLE SEVENTEEN: THE METAL FABRICATING GROUP OF INDUSTRIES

Distribution of Intermediate Demand

Industry	Intra-Group		Extra-Group				
	Intra Ind.	Total	Ranked in Descending Order				
	%	%	1st %	2nd %	3rd %	4th %	Others %
Boiler and Plate Works	3.4	7.2	Const. 79.9	A.O.Mach. 4.6	Other Metal 3.0	2.3	3.0
Fab. Structural Metal	2.2	8.9	Const. 79.9	A.O.Mach. 5.4	Aircraft 1.0	El.Appl. 0.7	4.1
Orn. and Arch. Metal	0.3	0.5	Const. 98.5	Mtr Veh. 0.5	Other Trans Equip. 0.3	A.O.Mach. Equip. 0.2	-
Metal Stamp. Pressing and Coating	8.7	12.9	Const. 25.2	Fr.& Veg.Can 14.4	Misc. Mfr. 4.4	Dairy Proc. 3.1	40.0
Wire and Wire Products	10.4	13.6	Op.& Supp 26.2	Const. 21.6	Mtr. Veh. 6.5	Pulp & Paper 5.2	26.9
Hardware, Tools & Cutlery	2.2	5.2	Op.& Supp 42.5	Const. 32.7	El. Appl. 5.6	Furniture 4.5	9.5
Heating Equipment	0	6.3	Const. 89.9	El Appl. 2.6	A.O.Mach.& Equip. 0.1	-	1.1
Other Metal Fab. Ind.	6.2	16.8	Const. 38.9	A.O.Mach. Equip. 14.4	Mtr. Veh. Pts. 5.0	El. Appl. 4.8	20.1

Derived from Statistics Canada, The Input-Output Structure of the Canadian Economy, 1961, Volume II, Table 13.

Source: EDAB

ii) The Transportation Equipment Group of Industries

Based upon its performance in terms of employment from 1961 to 1969 this group of industries shows good potential for growth in Manitoba. It was a large fast growth group in both Canada and Manitoba; shift-share analysis revealed that Manitoba was doing well compared with the other provinces in that this group was growing faster in Manitoba than in the nation as a whole and as a consequence Manitoba was increasing its share of employment (see above p. 206). However, when the performance is viewed from a longer time perspective and the three-digit industry level, the conclusion of good growth potential needs to be modified.

The strong growth in employment that occurred in the 1960's remained in the early 1970's. Between the years 1969 and 1973, employment in this group at the national level grew by 10% and in Manitoba by 24% (see Tables Ten and Eleven). In terms of new job creation, this group ranked first in Canada and in Manitoba (58,475 and 2,334 new jobs net respectively) between 1961 and 1969; it ranked second in both jurisdictions in the 1969 to 1973 period (15,603 and 1,075 new jobs net respectively). However, this rapid growth in the 1960's and 1970's was preceded by a period of strong contraction from 1952, if not earlier, to 1959. In Canada during this period, employment declined by 32,754 people (a reduction of 22.4%); in Manitoba employment dropped by 1,904 people (a reduction of 24.6%). In both absolute and percentage terms this decline in employment was one of the greatest of all the groups during the 1950's. As a result, this group's size fell from 11.4% of Canada's total manufacturing labour force in 1952 to 8.7% in 1959. The decline in relative size was of an even greater magnitude in Manitoba (17.9% to 13.6%). It should be noted that this group of industries was relatively larger in Manitoba than in Canada considered as a whole (see Tables Eight and Nine).

Due to the changes in the government's classification system in 1960, it is not possible to know exactly the actual increase in jobs between 1952 and 1973. It is probable that the growth from 1961 to 1973 was greater than the decline from 1952 to 1959. However, the growth rate is not nearly as impressive when the period 1952 to 1973 is considered as it is when the period 1961 to 1973 is considered.*

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* The data in Tables Five to Ten inclusive suggests that Manitoba tended to lead Canada in the cyclical trends. From 1952 to 1955 Manitoba's growth rate was minus 20.2% while Canada's was 10.0%; from 1955 to 1959 the decline decelerated in Manitoba (minus 5.4%) while Canada's accelerateddownward (minus 13.8%). Similarily, the upsurge in growth that began around 1965 appears to have been lead by Manitoba.

Shift-share analysis reveals that the decline of employment for this group in Manitoba during the 1950's was almost entirely due to the industr mix component while the expansion in the 1960's and 1970's was partly due to a positive industry mix component (the industry mix component indicates to what extent growth trends were influenced by national rather than regional forces), but the competitive component was stronger and increasingly so (see Tables Twelve, Thirteen and Fourteen).

The conclusion to be drawn from the analysis at the group level is th the Transportation Equipment Industries show good employment growth potential f Manitoba. Like many industries, this group of industries apparently went throu a rationalization process in the 1950's but by 1960 this process was completed and growth has been impressive since. In addition, this group of industries is a large employer relative to other manufacturing groups in Canada and in Manito Also, Manitoba appears to have some comparative advantage in this area of produ tion because Manitoba has a slighly greater share (and an increasing share) of this group's national employment than it does of manufacturing employment considered as a whole.

Some greater insight as to what has been happening in this group of industries can be gained by examining the individual industries. According to the Standard Industrial Classification Code (SIC) of 1960, there were eight thr digit level industries within this group. Of these eight only five were import employers in Manitoba during the 1961 to 1969 period (see Table Eighteen).

In terms of employment, the Railway and Rolling Stock Industry was by far the largest industry in the group in 1961. This industry was contracting in size, a trend that had begun at least in the early 1950's. In fact, this industry was the dominant one of this group in Manitoba during the 1950's and thus it was its decline which almost entirely accounted for the poor growth of the group. (During this 1952 to 1959 period Manitoban employment in the group would have increased by 585 or 38.2% if the Railway and Rolling Stock Industry is excluded; see Table Eighteen, Part B.) The same cannot be said at the national level. Although the Railway and Rolling Stock Industry declined just as rapidly in the nation considered as a whole as it did in Manitoba, this industry was not as large an employer relatively speaking in the nation as it w in Manitoba. Also, the other industries in the group contrary to the Manitoban experience contracted or grew slowly (relative to the average national manufact growth rate) as well during the 1950's (see Table Eighteen, Part B). The shift-share analysis for the Railway and Rolling Stock Industry for both periods (1952 to 1959 and 1961 and 1969) show clearly that its decline in Manitoba was due almost entirely to the fact that this industry was a declining industry nationally (a strong negative industry mix component).

The Aircraft and Parts Industry in terms of employment was not a growth industry in Canada during the period 1952 to 1973; in addition the size of its work-force in Manitoba was quite cyclical over time. From 1952 to 1965, employment at the national level actually declined by 10.0%, 13.7% and 2.3% from 1951 to 1955, 1955 to 1959 and 1961 to 1965 respectively. From 1965 to 1969 its employment increased by 23.2% compared to 7.4% for the manufacturing sector considered as a whole. From 1969 to 1973 its employment decreased by 24% compared to an increase of 4.4% for the manufacturing sector. The reason growth accelerated after 1965 needs to be explored.

Within Manitoba, employment in this industry grew secularly from 1952 to 1969 but was quite cyclical about the growth path. Beginning in 1952 there were approximately 700 employees in this industry in Manitoba,by 1969 there were 1,822. However, from 1952 to 1955 employment contracted by 34.0%, from 1955 to 1959 it expanded by 120%, from 1961 to 1965 it again contracted by 49.0%, and from 1965 to 1969 it shot up by 335%.

Due to confidentiality requirements, employment for Manitoba in the Aircraft and Parts Industry was combined with the employment in the Motor Vehicle Manufacturing Industry for every year except 1969. Thus, our growth rates are estimates only and should be interpreted accordingly. However, despite this qualification, it can still be said that the Aircraft and Parts Industry in Manitoba experienced unstable growth in the 1950's and 1960's. The causes lie primarily with factors which influence the competitive effects component (see Table Eighteen).

The Motor Vehicle Manufacturing Industry was not a strong growth industry in Manitoba (Our estimates show it to be declining in employment especiall in the 1960's. After allowing for errors due to our estimation methods, it is safe to say that this industry was at least not a strong growth industry); but its sister industry, Motor Vehicle Parts and Accessories seems to have grown somewhat in Manitoba in the 1950's and 1960's. Growth during the 1950's was not strong for either of these industries at the national level. However, a strong competitive effects component for the Motor Vehicles Parts and Accessories Industry was responsible for an impressive growth rate of 166.7% in Manitoba during the 1950's.

In the 1960's when the economy in general was experiencing a revival, these two industries grew faster than the national average and this had a positive impact on Manitoba. However, the competitive effects component was negative in Manitoba. The negative competitive effects component for Motor Vehicle Manufacturing was so strong that despite the strong growth at the national level, this industry actually contracted by approximately 60% during this period.* The negative competitive effects component for the Motor Vehicle Parts and Accessories Industry in Manitoba was not strong enough to completely off-set the strong growth in this industry in Manitoba (60.4% from 1961 to 1969). It should be noted that Manitoba did relatively well in the 1950's - a time of slow growth nationally and that Manitoba did relatively poorly in the 1960's - a time of fast growth nationally. These two industries are highly concentrated in Southern Ontario (see Paper No. Two, pp.151,157) and no doubt its monopolistic character and the U.S. - Canadian Auto Trade Agreement have had their repercussions in Manitoba.

The Truck Body and Trailer Industry, a new industry classification in 1960 experienced spectacular growth from 1960 to 1969. Employment in Manitoba increased from 130 to 1,515 and Manitoba's share of this industry in the nation increased from 4% to 15%. It is obvious that Manitoba was competing well in this fast growth industry. The industry mix component indicates that if this industry in Manitoba had grown at the same rate as it did on average elsewhere in Canada, there would have been an increase of 222 jobs in Manitoba over and above what there would have been, had the industry only grown at the average national rate for all manufacturing industries. Instead, the net relative change was an increase of 1,346 jobs. In other words, this nationally fast growth industry was growing

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* This industry might have been doing poorly in Manitoba in the 1950's as well. In the 1960 S.I.C. revisions a new industry named the Truck Body and Trailer Industry was created; many of its establishments were formerly classified to Motor Vehicle Manufacturing. In light of the strong growth performance of the new industry in the 1960's in Manitoba, it is possible that it was the growth of these establishments in the 1950's that counteracted a contracting labour force for the establishments which remained in the Motor Vehicle Manufacturing Industry after the 1960 revision.

TABLE EIGHTEEN: TRANSPORTATION EQUIPMENT INDUSTRIES

A) 1961 - 1969

GROUP # 15, MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	ΔN			
321	Aircraft & parts	820*	1822	2.9	5.3	122.2	1002	$\overline{7}56$	78	835
323	Motor vehicle mfg.	547*	204*	2.5	0.5	$\overline{6}2.7$	$\overline{3}43$	$\overline{5}06$	347	$\overline{8}53$
324	Truck body & trailer	130	1515	3.9	15.0	1065.4	1385	1346	222	1124
325	Mo. veh. pts. & acces.	265	425	1.3	1.0	60.4	160	80	184	$\overline{1}03$
326	Rlwy rolling stock	3374	204*	20.4	3.3	$\overline{9}4.0$	$\overline{3}170$	$\overline{4}183$	$\overline{3}136$	$\overline{1}046$
327	Shipbldg. & repair	-	-	-	-	-	-	-	-	-
328	Boatbldg. & repair	40	115	2.7	4.3	187.5	75	63	21	42
329	Misc. vehicle	-	C	-	C	n/a	n/a	n/a	n/a	n/a

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

B) 1952 - 1959

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share			$\frac{Ei}{E}$	
		1952	1959	1952	1959	1952-1959	1952-1959	NRC	IM	CE	1952	1959
				%	%	%	ΔN					
330	Aircraft & Parts	684*	1003*	2.1	3.5	+46.6	319	315	-102	418	2.6	2.2
332	Bicycles & Parts	0	0	0	0	0	0	0	0	0	0.1	0.1
333	Boatbldg. & repair	18	60	1.2	3.4	+233.6	42	42	3	39	0.1	0.1
334	Motor Vehicles	684*	668*	2.2	2.3	-2.3	-16	-19	-61	42	2.4	2.2
335	Mtr. Veh. Pts. & Acces.	144	384	0.7	2.0	166.7	240	239	-19	259	1.7	1.5
336	Rwy. & Rolling Stock	6225	3735	17.3	18.4	-40.0	-2490	-2526	-2768	242	2.8	1.6
337	Shipbldg. & Repair	0	0	0	0	0	0	0	0	0	1.6	1.1
339	Miscellaneous	0	0	0	0	0	0	0	0	0	0.1	0.1

even faster in Manitoba (see Table Eighteen). Based upon its growth performan this industry merits closer analysis.

The vast majority of the products of the Truck Body and Trailer Indus (SIC #324) are classified as final goods rather than intermediate goods (see Table Twenty). Hence, analyses of intermediate demand is of little value. Wh inter-industry shipment there is goes largely to other industries within the transportation group. The conclusion that there are few forward linkages for this industry other than to final demand must be qualified somewhat. The fina demand category can be further classified into capital or consumer goods. No doubt, a considerable proportion of the final demand for this industry could b classified as capital goods and the purchasers were other industries (or the government) rather than the consumer. Such purchases could be viewed as forwa linkages. Unfortunately, the government does not classify final demand into consumer and capital goods.*

In the 1970 revision of the SIC this three-digit industry was disaggr gated further into three four-digit industries. In light of the spectacular growth of the three-digit level industry in the 1960's and early 1970's it is interesting to note what the four-digit industries are.

TABLE TWENTY-ONE

THE TRUCK BODY AND TRAILER INDUSTRY

#S.I.C. (1970)	Industry	Principle Products
324	Truck Body and Trailer	
3241	Commercial Vehicles	- Buses and Chassis - Trucks, Truck Chassis, Truck Tractors
3242	Commercial Trailers and Semi-Trailers	- Other Trailers and Semi-Trailers
3243	Motor Vehicles and Accessories, nes.	- Military Motor Vehicles Motorcycles and Special Purpose Motor Vehicles - Trailers, cabin or hous type - Bodies and Cabs for Tru

* In order to make the Input-Output Tables consistent with G.N.P. ac ing, Statistics Canada quite correctly placed capital goods in the final dema category. Unfortunately for the purposes of our research it would have been better to have had capital goods classified to intermediate demand.

The demand and supply characteristics of the other industries within this group are similar to those of the Truck Body and Trailer Industry. However, a few exceptions should be noted. First, the vast majority of the final demand in the Aircraft and Parts Industry is made up of'Aircraft and Parts' manufacturing as opposed to'Aircraft Repair'. Second, this industry's domestic production capacity was 83% of total domestic demand but in 1961, 50.8% of domestic demand was supplied by imports while the equivalent of 31.7% of domestic demand was exported. Obviously the market for the products of this industry is international and the slow growth of this industry nationally and the cyclical nature of employment within Manitoba has to be examined from that perspective. Also, it was found in Paper No. Two of this research program, that the Aircrafts and Parts Industry accounted for a significant part of the total research and development expenditures in manufacturing (see Paper No. 2, Table 8, p.124). Based upon these four facts (international markets, slow national growth, cyclical provincial growth, large research and development expenditures) the potential growth of this industry in Manitoba is not good. At minimum, the vitality of the industry would require a large captive market and a large pool of working capital. These two requirements imply that a necessary condition for success is government involvement in some way.

Second, the Motor Vehicle Parts and Accessories Industry is obviously tied very closely to the Motor Vehicles Industry. Intermediate demand accounted for 88% of total domestic demand in 1961 and 78% of this intermediate demand was from other industries in this group (67.5% from the Motor Vehicles Industry and 10.1% from intra-industry transfers). The other statistics on Table Nineteen with respect to domestic output, imports and exports as a percentage of domestic demand for 1961, are obviously of little value because of changes that have occurred since then. The potential of this industry for Manitoba would have to take into consideration such things as the U.S.-Canadian Auto Pack Agreement, the monopolistic nature of the Motor Vehicle Industry in Canada, the recent influence of non-American imports and the long run prospects and desirability of the combustible engine automobile.

To conclude, the analysis in this paper suggests that the Truck Body and Trailer Industry should have a high priority for further intensive study. The Aircraft and Parts Industry, Motor Vehicles Industry and the Motor Vehicles Parts and Accessories Industries, based upon their sheer size should also be examined.

However, there are enough signs to indicate that there are enough compicating factors associated with these industries to indicate that promotion of these industries should be made only after a very careful analyses has been made.

TABLE NINETEEN: THE TRANSPORTATION EQUIPMENT GROUP OF INDUSTRIES

STRUCTURAL CHARACTERISTICS

OF APPARENT DEMAND AND SUPPLY - 1961

INDUSTRY	T.O.	- Ex	- ΔI	$=TO_d$	+ M	$=TD_d$	= I.D.	+ F.D.
Aircraft and Parts	347.5 (83.4%)	-132.3 (-31.7%)	-10.5 (-2.5%)	204.9 (49.2%)	+211.9 (50.8%)	416.8 (100.0%)	87.7 (21.0%)	329.1 (79.0%)
Motor Vehicles (Passenger Cars)	698.5 (83.0%)	- 17.9 (-2.1%)	-14.7 (-1.7%)	665.9 (79.2%)	+175.2 (20.8%)	841.1 (100.0%)	0.0 (0.0%)	841.1 (100.0%)
Truck Body and Trailer								
Commercial Vehicles	158.0 (90.4%)	- 6.1 (-3.5%)	- 3.6 (-2.1%)	148.3 (84.8%)	+ 26.5 (15.2%)	174.8 (100.0%)	0.6 (0.1%)	174.2 (99.9%)
Commercial Trailers	21.7 (74.3%)	- 0.8 (-2.7%)	0.0 (0.0%)	20.9 (71.6%)	+ 8.3 (28.4%)	29.2 (100.0%)	1.0 (3.4%)	28.2 (96.6%)
Vehicle Body and Trailer	33.6 (67.2%)	- 4.4 (8.8%)	-0.2 (0.4%)	29.0 (58.0%)	+ 21.0 (42.0%)	50.0 (100.0%)	2.1 (4.2%)	47.9 (95.8%)
Motor Vehicle Parts Accessories	339.0 (49.5%)	- 20.1 (-2.9%)	-2.1 (0.3%)	316.8 (46.3%)	+367.9 (53.7%)	684.7 (100.0%)	603.1 (88.1%)	81.6 (11.9%)
Railway Rolling Stock	57.5 (92.6%)	- 7.5 (-12.1%)	+1.2 (1.9%)	51.2 (82.4%)	+ 10.9 (17.6%)	62.1 (100.0%)	35.3 (56.8%)	26.8 (43.2%)
Boatbuilding and Repair	84.8 (83.7%)	- 9.9 (-9.8%)	-0.0 -	74.9 (73.9%)	+ 26.4 (26.1%)	101.3 (100.0%)	10.6 (10.5%)	90.7 (89.5%)

For Explanation and Source - see Table 16, p. 210 above

TABLE TWENTY: THE TRANSPORTATION GROUP OF INDUSTRIES
DISTRIBUTION OF INTERMEDIATE DEMAND

Industry	Intra-Group		Extra-Group				
	Intra-Ind.	Total	Ranked in Descending Order				
			1st	2nd	3rd	4th	Others
	%	%	%	%	%	%	%
Aircraft and Parts	85.2	85.2	Trans. & Storage 13.3	Agric. 1.1	–	–	0.4
Motor Vehicles (Passenger Cars)	–	–	–	–	–	–	–
Truck Body & Trailer							
Commercial Vehicles	0.0	80.0	A.O.Mach. 20.0	–	–	–	–
Commercial Trailers	0.0	54.5	Other Mtl. 37.3	Mtl. Stamp. 4.1	Elec. App. 4.1	–	–
Veh. Body & Trailer	0.0	52.4	Oper.Supp 47.6	–	–	–	–
Motor Vehicle Parts and Accessories	10.1	78.0	Oper Supp 15.1	Trans & Stor 4.7			2.2
Railway Rolling Stock	0.0	34.0	Trans. & Stor. 62.6	Mining 2.8			0.6
Boatbuilding & Repair	81.9	81.9	Trans.& Stor. 14.3	–	–		3.8

Appendix

TABLE ONE: Shift-Share Analysis of Manitoban Manufacturing Employment for Three Digit Level S.I.C. Industries.

	Net Relative Change	Industry Effect	Regional Effect
Part A)	+	+	+
B)	+	+	-
C)	+	-	+
D)	-	+	-
E)	-	-	+
F)	-	-	-

TABLE TWO: Shift-Share Analysis of Manitoba Manufacturing Value Added for Three-Digit Level S.I.C. Industries 1961-1969.

	Net Relative Change	Industry Effect	Regional Effect
Part A)	+	+	+
B)	+	+	-
C)	+	-	+
D)	-	+	-
E)	-	-	+
F)	-	-	-

TABLE THREE: Discrepancies Between Value Added and Employment Shift-Share Analysis - Manitoba 1961 - 1969.

TABLE FOUR: Manufacturing Group-Level Performance, Employment, 1961-1969.

TABLE FIVE TO TWENTY-TWO INCLUSIVE:

Shift-Share Analysis of Manitoban Manufacturing Employment for Three-Digit Level S.I.C. Industries Arranged By Group, 1961-1969.

TABLE: 1 SHIFT SHARE ANALYSIS: MANUFACTURING EMPLOYMENT - MANITOBA 1961 - 1969;

A) (+ + +) THREE DIGIT LEVEL S.I.C. INDUSTRIES

Industry			Size in Manitoba		Growth		Shift-Share		
			1961 (%)	1969 (%)	% △	△	+ NRC	+ I.E.	+ R.E.
1.	Fabr. Str. Metal	302	765(1.9)	1118(2.3)	46.1	+353	+123	+15	+108
2.	Miscellaneous Food	139	530(1.3)	1030(2.1)	94.3	+500	+341	+42	+299
3.	Misc. Metal Fabr.	309	507(1.2)	881(1.8)	73.8	+374	+222	+66	+155
4.	Misc. Mach. & Equip. Mfgs.	315	450(1.1)	980(2.0)	117.8	+530	+395	+340	+91
5.	Food Mfrs.	123	243(0.6)	585(1.2)	140.7	+342	+269	+11	+258
6.	Ornamental & Arch. Met.	303	239(0.6)	584(1.2)	144.4	+345	+273	+11	+263
7.	Signs & Display Ind.	397	164(0.4)	350(0.7)	113.4	+186	+137	+22	+115
8.	Ready-Mix Concrete	348	162(0.4)	339(0.7)	109.3	+177	+128	+88	+40
9.	Mfrs. of Elec. Equip.	336	159(0.4)	600(1.2)	277.4	+441	+393	+40	+354
10.	Truck Body & Trail. Mfrs.	324	130(0.3)	1515(3.1)	+1065.4	+1385	+1346	+222	+.124
11.	Sc. & Prof. Eq. Mfrs.	381	83(0.2)	361(0.7)	+334.9	+278	+253	+56	+197
12.	Wire & Wire Products	305	43(0.1)	102(0.2)	+137.2	+59	+46	+5	+41
13.	Hardware Tool & Cutlery	306	43(0.1)	86(0.2)	+100.0	+43	+30	+16	+14
14.	Boatbuilding & Repair	328	40(0.1)	115(0.2)	+187.5	+75	+63	+21	+42
15.	Oth. Non-Met. Min. Prod.	359	21(0.1)	114(0.2)	+442.9	+93	+87	+5	+81
16.	Mfrs. of Small Elec. Appl.	331	12(0.0)	240(0.5)	+1900.0	+228	+224	+4	+221
	Total Manufacturing								

TABLE: 1

MANUFACTURING EMPLOYMENT - MANITOBA 1961 - 1969

B) (+ + -)

Industry	Size in Manitoba		Growth		Shift-Share		
	1961 (%)	1969 (%)	% Δ	Δ	+ NRC	+ I.E.	- R.E.
1. Soft Drink Mfrs. 141	359(0.9)	646(1.3)	79.9	+287	+179	+212	-33
2. Motor Veh. Pts.& Access. 325	265(0.6)	425(0.9)	60.4(0.9)	+160	+80	+184	-104
3. Metal Rolling Cast,Extr. 298	118(0.3)	180(0.4)	52.5	+62	+27	+62	-35

Where Δ = Change in Employment between 1969 and 1961
NRC = Net Relative Change
I.E. = Industry Effect
R.E. = Regional Effect

TABLE: 1

MANUFACTURING EMPLOYMENT - MANITOBA 1961 - 1969

C) (+ - +)

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	+ NRC	- I.E.	+ R.E.
1. Women's Clothing	244	1603(3.9)	2198(4.4)	37.1	595	113	-99	+212
2. Aircraft & Parts	321	820(2.0)	1822(3.7)	122.2	+1002	756	-78	+834
3. Agric. Implement Mfrs.	311	528(1.3)	1664(3.4)	215.2	+1136	+977	-78	+1055
4. Fr.&Veg. Can.&Preserv.	112	313(0.8)	763(1.5)	143.8	+450	+356	-42	+398
5. Heating Equip. Mfrs.	307	246(0.6)	401(0.8)	63.0	+155	+81	-67	+148
6. Leather Glove	175	236(0.6)	394(0.8)	66.9	+158	87	-32	+119
7. Pulp&Paper Mills	271	208(0.5)	362(0.7)	74.0	+154	91	-31	+122
8. Breakfast Cereal Mfrs.	125	178(0.4)	279(0.6)	56.7	+101	+48	-55	+103
9. Asphalt Roofing	272	139(0.3)	242(0.5)	74.1	+103	+61	-51	+112
10. Biscuit Mfrs.	128	134(0.3)	372(0.8)	177.6	+238	+198	-17	+215
11. Veg. Oil Mfrs.	135	89(0.2)	186(0.4)	+109.0	+97	+70	-5	+75
12. Glass & Glass Prod.	356	81(0.2)	119(0.2)	+46.9	+38	+14	-1	+15
13. Mfrs. of Ind. Chem.	378	76(0.2)	390(0.8)	+413.2	+314	+291	-1	+292
14. Canvas Products	221	74(0.2)	114(0.2)	+54.1	+40	+18	-5	+23
15. Miscellaneous Wood	259	73(0.2)	148(0.3)	+102.7	+75	+53	-12	+65
16. Sugar Refineries	133	45(0.1)	93(0.2)	+106.7	+48	+34	-14	+48
17. Leather Tanneries	172	44(0.1)	131(0.3)	197.7	+87	+74	-18	+92
18. Leather Lug.& Handbag	179	37(0.1)	83(0.2)	124.3	+46	+35	-3	+38
19. Coffin & Casket	258	29(0.1)	84(0.2)	189.7	+55	+46	-9	+55

TABLE: 1

MANUFACTURING EMPLOYMENT - MANITOBA 1961 - 1969

D) (- + -)

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	- NRC	+ I.E.	- R
1. Met.,Stamp,Press & Coat.	304	992(2.4)	1139(2.3)	+14.8	+147	-150	+336	-486
2. Paper Box & Bag	273	652(1.6)	595(1.2)	-8.7	-57	-252	+29	-281
3. Miscellaneous Furn.	266	650(1.6)	597(1.2)	-8.2	-53	-247	+82	-329
4. Misc. Paper	274	554(1.3)	293(0.6)	-47.1	-261	-426	+164	-591
5. Motor Vehicle Mfrs.	323	547(1.3)	204(0.4)	-62.7	-343	-506	+347	-853
6. Machine Shops	308	416(1.0)	532(1.1)	+27.9	+116	-8	+201	-209
7. Miscellaneous Textiles	229	376(0.9)	314(0.6)	-16.5	-62	-174	+208	-382
8. Iron Foundries	294	316(0.8)	333(0.7)	+5.2	+17	-77	+37	-114
9. Paint & Varnish Mfrs.	375	312(0.8)	251(0.5)	-19.6	-61	-154	+34	-188
10. Misc. Electrical Prods.	339	247(0.6)	300(0.6)	+21.5	+53	-20	+71	-91
11. Battery Mfrs.	337	239(0.6)	240(0.5)	+0.4	+1	-70	+11	-81
12. Plastic Fabr. nes	385	184(0.4)	129(0.3)	-29.9	-55	-109	+250	-359
13. Elec. Wire & Cable	338	159(0.4)	120(0.2)	-24.5	-39	-86	+8	-94
14. Publishing only	288	136(0.3)	131(0.3)	-3.7	-5	-45	+14	-59
15. Soap & Clean. Compds.	376	107(0.3)	73(0.1)	-31.8	-34	-65	+11	-76
16. Com.Refrig.&Air Cond.Mfr	316	104(0.3)	98(0.2)	-5.8	-6	-36	+56	-92
17. Oth. Chemical Ind.	379	99(0.2)	104(0.2)	+5.1	+5	-24	+21	-45
18. Mfrs.of Pharm&Med.	374	71(0.2)	31(0.1)	-56.3	-40	-60	+26	-86

cont'd ...

D) Cont'd

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	- NRC	+ I.E.	- R
19. Carpet Mat & Rug	216	35(0.1)	7(0.0)	-80.0	-28	-38	+54	-92
20. Office Furniture	264	33(0.1)	18(0.0)	-45.5	-15	-24	+15	-39
21. Sport. Goods & Toys	393	15(0.0)	2(0.0)	-87.7	-13	-17	+3	20
22. Boiler & Plate Works	301	14(0.0)	17(0.0)	+21.4	+3	-0	+5	-5

TABLE: 1

MANUFACTURING EMPLOYMENT - MANITOBA 1961 1969

E) (- - +)

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	- NRC	- I.E.	+ R.E.
1. Men's Clothing	243	2920(7.1)	3543(7.2)	+27.3	+623	-254	-371	+117
2. Publish. & Printing	289	1772(4.3)	2127(4.3)	+20.0	+355	-177	-397	+220
3. Sash, Door etc.	254	629(1.5)	669(1.4)	+6.9	+43	-22	-76	+54
4. Children's Clothing	245	313(0.8)	342(0.7)	+15.7	+49	-44	-111	+67
5. Shoe Factories	174	220(0.5)	263(0.5)	+19.5	+43	-22	-76	+54
6. Venetian Blind Mfrs.	384	27(0.1)	15(0.0)	-44.4	-12	-19	-22	+3

TABLE: 1

MANUFACTURING EMPLOYMENT - MANITOBA 1961 - 1969

F) (- - -)

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	- NRC	- I.E.	- R.E.
1. Rwy. Rolling Stock	326	3374(8.2)	204(0.4)	-94.0	-3170	-4183	-3136	-1047
2. Slaugh. & Meat Process	101	2981(7.3)	2826(5.7)	-5.2	-155	-1050	-661	-389
3. Commercial Printing	286	1713(4.2)	1646(3.3)	-3.9	-67	-581	-165	-416
4. Bakeries	129	1694(4.1)	1219(2.5)	-28.0	-475	-983	-703	-280
5. Dairy Products	105	1515(3.7)	1354(2.7)	-10.6	-161	-615	-529	-86
6. Household Furniture	261	1070(2.6)	1277(2.6)	+19.3	+207	-114	-65	-49
7. Iron & Steel Mills	291	829(2.0)	868(1.8)	+4.7	+39	-209	-47	-162
8. Smelting & Refining	295	829(2.0)	868(1.8)	+4.7	+39	-209	-133	-76
9. Breweries	145	623(1.5)	659(1.3)	+5.8	+36	-150	-54	-96
10. Concrete Products	347	472(1.1)	446(0.9)	-5.5	-26	-167	-47	-120
11. Flour Mills	124	443(1.1)	279(0.6)	-37.0	-164	-296	-183	-113
12. Fur Goods	246	436(1.1)	171(0.3)	-60.8	-265	-395	-230	-165
13. Hat & Cap	247	362(0.9)	157(0.3)	-56.6	-205	-313	-273	-40
14. Confectionery Mfrs.	131	278(0.7)	159(0.3)	-42.8	-119	-202	-34	-168
15. Gypsum Products	345	277(0.7)	114(0.2)	-58.8	-163	-245	-91	-154
16. Sawmills	251	200(0.5)	223(0.5)	+11.5	+23	-36	-18	-18
17. Miscellaneous	399	190(0.5)	32(0.1)	-83.2	-158	-214	-6	-208

cont'd ...

F) Cont'd

Industry	Size in Manitoba		Growth		Shift-Share		
	1961 (%)	1969 (%)	% Δ	Δ	- NRC	- I.E.	- R.E.
18. Plate Making, Typesetting & Trade Industry 287	187(0.5)	221(0.4)	+18.2	+34	-21	-9	-12
19. Broom, Brush & Mop 383	143(0.3)	13(0.0)	-90.9	-130	-172	-28	-144
20. Cement Mfrs. 341	139(0.3)	114(0.2)	-18.0	-25	-66	-12	-54
21. Wooden Box Factories 256	132(0.3)	56(0.1)	-57.6	-76	-115	-10	-105
22. Miscellaneous 398	86(0.2)	7(0.0)	-91.9	-79	-104	-1	-103
23. Lime Mfrs. 343	76(0.2)	57(0.1)	-25.0	-19	-41	-33	-8
24. Stone Products 353	71(0.2)	10(0.0)	-85.9	-61	-81	-48	-33
25. Electrical Lamp & Shade 268	65(0.2)	54(0.1)	-16.9	-11	-30	-7	-23
26. Clay Products Mfrs, 351	62(0.2)	36(0.1)	-41.9	-26	-44	-16	-28
27. Other Clothing Industries 249	60(0.1)	40(0.1)	-33.3	-20	-37	-29	-8
28. Cotton & Jute Bag 223	55(0.1)	22(0.0)	-60.0	-33	-49	-19	-30
29. Wool Cloth Mills 197	35(0.1)	7(0.0)	-80.0	-28	-38	-10	-28
30. Fur Dress. & Dyeing 395	34(0.1)	4(0.0)	-88.2	-30	-39	-19	-20
31. Explosives & Ammunition 371	18(0.0)	21(0.0)	+16.7	+3	-1	-1	-0
32. Mfrs. of Mixed Fertilizer 372	18(0.0)	10(0.0)	-44.4	-8	-12	-3	-9
33. Jewellery & Silverware 131	38(0.0)	38(0.1)	0	0	-11	-1	-10

TABLE: 2

SHIFT-SHARE ANALYSIS: MANUFACTURING VALUE ADDED - MANITOBA 1961-1969;
THREE DIGIT LEVEL S.I.C. INDUSTRIES

A) (+ + +)

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	+ NRC	+ I.E.	+ R.E.
1. Feed Mfrs.	123	2742(0.9)	7198(1.5)	162.5	4456	2065	305	1760
2. Miscellaneous Food	139	6012(1.9)	12936(2.7)	115.2	6924	1681	172	1508
3. Sawmills	251	544(0.2)	1830(0.4)	236.4	1286	812	359	453
4. Miscellaneous Wood	259	464(0.1)	1688(0.3)	263.8	1224	819	46	773
5. Fab. Struc. Met	302	4055(1.3)	9537(2.0)	135.2	5482	1945	1791	154
6. Orn. & Arch. Met.	303	1657(0.5)	5154(1.1)	211.0	3497	2052	7	2044
7. Wire	305	299(0.1)	878(0.2)	193.6	579	318	103	215
8. Hardware	306	299(0.1)	797(0.2)	166.6	498	237	106	131
9. Misc. Metal Fabric.	309	4327(1.4)	9995(2.1)	131.0	5668	1894	388	1506
10. Agricultural Imp.	311	3732(1.2)	16043(3.3)	329.9	12311	9056	650	8406
11. Truck Boat & Trailer	324	630(0.2)	11246(2.3)	1686.1	10616	10067	1580	8486
12. Boatbuilding & Repair	328	145(0.0)	794(0.2)	447.6	649	523	224	299
13. Small Electrical Appl.	331	28(0.0)	2427(0.5)	8567.9	2399	2375	11	2364
14. Electrical Ind. Equip.	336	1457(0.5)	6067(1.2)	316.4	4610	3339	197	3142
15. Concrete Products	347	2601(0.8)	6182(1.3)	137.7	3581	1313	190	1122
16. Oth. Non-Met. Min.	359	147(0.0)	2618(0.5)	1681.0	2471	2343	36	2307
17. Scientific & Prof. Eq.	381	532(0.2)	3076(0.6)	478.2	2544	2080	467	1613

TABLE: 2

MANUFACTURING VALUE ADDED - MANITOBA 1961 - 1969

B) (+ + -)

Industry	Size in Manitoba		Growth		Shift-Share		
	1961 (%)	1969 (%)	% Δ	Δ	+ NRC	+ I.E.	- R.E.
1. Machine Shops 308	2432(0.8)	5254(1.1)	116.0	2822	701	3149	-2477
2. Misc. Machinery & Equip. 315	3258(1.0)	9347(1.9)	186.9	6089	3248	3891	-643
3. Motor Vehicle Parts 325	2115(0.7)	4322(0.9)	104.3	2207	362	4040	-3676
4. Misc. Electrical Prod. 339	1288(0.4)	2802(0.6)	117.5	1514	391	410	-18
5. Ready-Mix Concrete 348	1864(0.6)	4061(0.8)	117.9	2197	571	2239	-1666
6. Glass & Glass Products 356	477(0.2)	1058(0.2)	121.8	581	165	192	-26
7. Explosives & Ammun. 371	177(0.1)	367(0.1)	107.3	190	36	98	-61

TABLE: 2

MANUFACTURING VALUE ADDED - MANITOBA 1961 - 1969

C) (+ - +)

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	+ NRC	- I.E.	+ R.E.
1. Fruit & Vegetable Cann.	112	1875(0.6)	10876(2.2)	480.1	9001	7366	-379	7745
2. Biscuit Mfrs.	128	1505(0.5)	3999(0.8)	165.7	2494	1181	-426	1609
3. Sugar Refineries	133	502(0.2)	1000(0.2)	99.2	498	60	-144	205
4. Vegetable Oil Mills	135	1004(0.3)	1999(0.4)	99.1	995	119	-250	370
5. Leather Tanneries	172	175(0.1)	801(0.2)	357.7	626	473	-101	575
6. Leather Glove	175	790(0.3)	2404(0.5)	204.3	1614	925	-254	1180
7. Miscellaneous Leather	179	162(0.1)	473(0.1)	192.0	311	170	-23	194
8. Canvas Products	221	306(0.1)	658(0.1)	115.0	352	85	-42	128
9. Men's Clothing	243	9985(3.2)	19482(4.0)	95.1	9497	789	-482	1271
10. Coffin & Casket	258	186(0.1)	643(0.1)	245.7	457	295	-91	387
11. Pulp & Paper Mills	271	3279(1.0)	6799(1.4)	107.3	3520	660	-1236	1897
12. Aspnalt Roofing	272	2186(0.7)	4532(0.9)	107.3	2346	440	-769	1209
13. Aircraft & Parts	321	4595(1.5)	16737(3.4)	264.2	12142	8135	-75	8210
14. Industrial Chemicals	378	1199(0.4)	4985(1.0)	315.8	3786	2740	-113	2854
15. Signs & Displays	397	892(0.3)	1859(0.4)	108.4	967	189	-88	278

TABLE: 2

MANUFACTURING VALUE ADDED - MANITOBA 1961 - 1969

D) (- + -)

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	- NRC	+ I.E.	- R.E.
1. Carpet, Mat, & Rug	216	139(0.0)	40(0.0)	-71.2	-99	-219	537	-756
2. Miscellaneous Textile	259	2044(0.7)	1933(0.4)	-2.5	-51	-1833	2784	-4616
3. Wooden Box	256	622(0.2)	429(0.1)	-31.0	-193	-734	358	-1092
4. Household Furniture	261	5767(1.8)	9797(2.0)	69.9	4030	-999	542	-1540
5. Office Furniture	264	171(0.1)	131(0.0)	-23.4	-40	-188	211	-397
6. Misc. Furniture	266	3430(1.1)	4807(1.0)	40.1	1377	-1613	746	-2360
7. Electrical Lamp & Shade	268	343(0.1)	392(0.1)	14.3	49	-249	28	-277
8. Folding Cartons	273	5239(1.7)	9310(1.9)	77.7	4071	-497	715	-1212
9. Misc. Paper Converters	274	8744(2.8)	5584(1.1)	-36.1	-3160	-10785	1509	-12294
10. Iron Foundries	294	2474(0.8)	3232(0.7)	30.6	758	-1399	985	-2383
11. Met. Roll, & Cast.	298	1551(0.5)	2454(0.5)	58.2	903	-449	925	-1374
12. Boiler & Plate	301	100(0.0)	146(0.0)	46.0	46	-40	104	-145
13. Met, Stamp,Press&Coat.	304	6832(2.2)	11639(2.4)	70.4	4807	-1150	2684	-3835
14. Comm. Refridgeration	316	752(0.2)	935(0.2)	24.3	183	-472	456	-928
15. Motor Vehicles	323	3064(1.0)	1430(0.3)	-53.3	-1634	-4305	4590	-8895
16. Electrical Wire	338	1457(0.5)	1213(0.2)	-16.7	-244	-1514	291	-1805
17. Gypsum	345	5643(1.8)	2618(0.5)	-53.6	-3025	-7945	556	-8501

cont'd ...

D) cont'd

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	- NRC	+I.E.	- R.E.
18. Pharm. & Medicine	374	706(0.2)	551(0.1)	-22 0	-155	-770	143	-913
19. Jewellery	382	170(0.1)	206(0.0)	21.2	36	-111	20	-131
20. Plastic Fabr. nes	385	1485(0.5)	1724(0.4)	16.1	239	-1055	5430	-6485
21. Sporting Goods & Toys	393	45(0.0)	21(0.0)	-53.3	-24	-62	6	-68
22. Miscellaneous Mfr.*	138	503(0.2)	62(0.0)	-87.7	-441	-879	22	-901

*Includes: button
candle
hair goods
artificial flowers
model & pattern
musical instruments
typewriters
pen & pencil

TABLE: 2

MANUFACTURING VALUE ADDED MANITOBA 1961 - 1969

E) (- - +)

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	- NRC	- I.E.	+ R.E.
1. Slaughtering & Meat Proc	101	18893(6.0)	25309(5.2)	34.0	6416	-10060	-13922	3862
2. Breakfast Cereal	125	2008(0.6)	2999(0.6)	49.4	991	-759	-917	158
3. Soft Drink Mfrs.	141	4951(1.6)	8941(1.8)	80.6	3990	-327	-1200	873
4. Shoe Factories	174	871(0.3)	1602(0.3)	83.9	731	-28	-373	346
5. Women's Clothing	244	6793(2.2)	12492(2.6)	83.9	5699	-224	-396	172
6. Children's Clothing	245	1172(0.4)	1931(0.4)	64.8	759	-262	-365	103
7. Sash, Door etc.	254	3230(1.0)	5418(1.1)	67.7	2188	-628	-1185	557
8. Plate-Making	287	1107(0.4)	1962(0.4)	77.2	855	-109	-233	123
9. Publishing Only	288	1320(0.4)	2331(0.5)	76.5	1011	-139	-302	163
10. Publishing & Printing	289	13132(4.2)	22520(4.6)	71.5	9388	-2064	-3893	1829
11. Heating Equipment	307	2385(0.8)	3644(0.7)	52.8	1259	-820	-1282	462

TABLE: 2

MANUFACTURING VALUE ADDED - MANITOBA 1961 - 1969

F) (- - -)

		Size in Manitoba		Growth		Shift-Share		
Industry		1961 (%)	1969 (%)	% Δ	Δ	- NRC	- I.E.	- R.E.
1. Dairy Products	105	9426(3.0)	12900(2.7)	36.9	3474	-4746	-3577	-1167
2. Flour Mills	124	3659(1.2)	2999(0.6)	-18.0	-660	-3850	-2691	-1158
3. Bakeries	129	9650(3.1)	11027(2.3)	14.3	1377	-7038	-5327	-1710
4. Confectionery Mfrs.	131	1389(0.4)	889(0.2)	-36.0	-500	-1710	-257	-1453
5. Breweries	145	11835(3.8)	11159(2.3)	-5.7	-676	-10997	-5908	-5088
6. Wool Cloth Mills	197	139(0.0)	40(0.0)	-71.2	-99	-219	-12	-206
7. Cotton & Jute Bag	223	310(0.1)	121(0.0)	-61.0	-189	-458	-201	-257
8. Fur Goods	246	2032(0.6)	1337(0.3)	-34.2	-695	-2466	-1158	-1307
9. Hat & Cap	247	1322(0.4)	657(0.1)	-50.3	-665	-1817	-1519	-297
10. Other Clothing	249	220(0.1)	192(0.0)	-12.7	-28	-219	-152	-65
11. Commercial Printing	286	11559(3.7)	16900(3.5)	46.2	5341	-4739	-454	-4284
12. Iron & Steel Mills	291	14504(4.6)	10734(2.2)	-26.0	-3770	-16418	-2172	-14246
13. Smelting & Refining	295	14504(4.6)	10734(2.2)	-26.0	-3770	-16418	-13094	-3323
14. Rwy, Rolling Stock	326	17291(5.5)	1430(0.3)	-91.7	-15861	-30940	-17764	-13175
15. Battery Mfrs.	337	2185(0.7)	2427(0.5)	11.1	242	-1663	-470	-1192
16. Cement Mfrs.	341	2821(0.9)	2618(0.5)	-7.2	-203	-2662	-942	-1719
17. Lime Mfrs.	343	1590(0.5)	1309(0.3)	-17.7	-281	-1667	-1135	-531

F) cont'd

Industry		Size in Manitoba		Growth		Shift-Share		
		1961 (%)	1969 (%)	% Δ	Δ	-NRC	+ I.E.	-R.E.
18. Clay Products Mfrs.	351	437(0.1)	234(0.0)	-46.5	-203	-583	-114	-468
19. Stone Products	353	681(0.2)	107(0.0)	-84.3	-574	-1167	-622	-544
20. Mixed Fertilizer	372	177(0.1)	184(0.0)	4.0	7	-146	-30	-115
21. Paint & Varnish	375	3595(1.1)	4061(0.8)	13.0	466	-2668	-1143	-1525
22. Soap & Cleaning Cmpds.	376	1059(0.3)	1285(0.3)	21.3	226	-697	-334	-362
23. Other Chemicals	379	1769(0.6)	2422(0.5)	36.9	653	-889	-344	-544
24. Broom, Brush, Mop	383	658(0.2)	126(0.0)	-80.9	-532	-1105	-182	-922
25. Venetian Blind	384	150(0.0)	96(0.0)	-36.0	-54	-184	-182	-1
26. Fur Dressing	395	201(0.1)	42(0.0)	-79.1	-159	-333	-147	-185
27. Miscellaneous*	399	1106(0.4)	255(0.1)	-76.9	-851	-1815	-62	-1752

*Includes:

stamp & stencil
stationary
umbrella
artificial ice
other miscellaneous

TABLE: 3

DISCREPANCIES BETWEEN VALUE ADDED & EMPLOYMENT MEASURES, 1961-1969 MANITOBA

(with employment as a base)

CATEGORY	ADDITIONAL (VA)	MISSING (VA)
+ + +	sawmills miscellaneous wood agriculture implements concrete products	miscellaneous machinery & equipment signs & displays ready-mix concrete
+ + -	machine shops miscellaneous machinery & equipment miscellaneous electrical products ready-mix concrete glass & glass products explosives & ammunition	soft drink manufacturers metallic rolling & casting
+ - +	men's clothing signs & displays	women's clothing agriculture implements heating equipment breakfast cereal glass & glass products miscellaneous wood
- + -	wooden box household furniture electrical lamp & shade metal rolling & casting gypsum jewellery miscellaneous manufacturers (SIC 398)	machine shops paint & varnish miscellaneous electrical products battery manufacturers publishing only soap & cleaning compounds other chemical industries
- - +	slaughtering & meat processing breakfast cereal soft drink manufacturers women's clothing plate-making publishing only heating equipment	men's clothing venetian blind manufacturers

CONT'D ...

... CONT'D

CATEGORY	ADDITIONAL (VA)	MISSING (VA)
- - -	other chemicals venetian blind	gypsum products sawmills plate-making wooden box miscellaneous manufacturers (#398) electrical lamp & shade explosives & ammunition jewellery

TABLE FOUR: MANUFACTURING GROUP-LEVEL PERFORMANCE EMPLOYMENT, 1961-1969

REPRODUCTION OF TABLE SEVEN IN PAPER

	GROUP	CANADA	MANITOBA	COMMENTS
1.	Metal Fabricating Ind.	Large and Fast Growth	Large and Fast Growth	
2.	Transportation Equip.	Large and Fast Growth	Large and Fast Growth	
3.	Electrical Prod. Ind.	Large and Fast Growth	Small and Fast Growth	
4.	Machinery Industries	Small and Fast Growth	Small and Fast Growth	Fastest Growing Canada and Manit
5.	Textiles	Small and Slow Growth	Small and Fast Growth	
6.	Furniture and Fixtures	Small and Fast Growth	Small and Slow Growth	
7.	Misc. Manufacturing	Small and Fast Growth	Small and Slow Growth	
8.	Primary Metal Products	Large and Av. Growth	Large and Slow Growth	
9.	Paper Products	Large and Av. Growth	Small and Slow Growth	
10.	Chemical Products	Large and Av. Growth	Small and Slow Growth	
11.	Food and Bev. Prod.	Large and Slow Growth	Large and Slow Growth	Largest employer Can. & Man. Mani relatively large relatively slowe
12.	Clothing Industries	Large and Slow Growth	Large and Slow Growth	Man. relatively larger and relat faster
13.	Wood Products	Large and Slow Growth	Small and Slow Growth	Man. growing relatively faste
14.	Printing and Publish.	Large and Slow Growth	Large and Slow Growth	Man. growing relatively slowe
15.	Leather Products	Small and Slow Growth	Small and Av. Growth	
16.	Non-Metallic Min. Prod.	Small and Slow Growth	Small and Slow Growth	
17.	Knitting Products	Small and Slow Growth	Unknown	
18.	Rubber Products	Small and Slow Growth	Non-existent	
19.	Petroleum and Coal Prod.	Small and Slow Growth	Unknown	
20.	Tobacco Products	Small and Slow Growth	Non-existent	

Source: EDAB Shift Share Analysis, Oct. 1975

TABLE : 5

ELECTRICAL PRODUCTS INDUSTRIES, GROUP #16, MANITOBA EMPLOYMENT

1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	▲N			
331	Mfgs. small elec. app.	12	240*	0.3	4.0	1900.0	228	224	4	221
332	Mfgs. major appliances	-	C	-	C	n/a	n/a	n/a	n/a	n/a
334	Mfgs. household radio & TV	-	C	-	C	n/a	n/a	n/a	n/a	n/a
335	Common equip. Mfgs.	-		-	C	n/a	n/a	n/a	n/a	n/a
336	Mfgs. elec. ind. equip.	159*	600*	1.0	2.4	277.4	393	40	40	35
337	Battery Mfgs.	239*	240*	11.8	8.8	0.4	1	$\overline{7}0$	11	-81
338	Mfgs. elec. wire & cable	159*	120*	2.5	1.4	$\overline{2}4.5$	$\overline{3}9$	$\overline{8}6$	8	-9
339	Mfgs. misc. elec. prods.	247	300	2.7	2.1	21.5	53	$\overline{2}0$	71	-92

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE : 6

MACHINERY INDUSTRIES, GROUP #14, MANITOBA EMPLOYMENT

1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	▲N			
311	Agric. implement	528	1664	5.0	13.8	215.2	1136	977	-78	1057
315	Misc. mach. & equip.	450*	980*	1.7	1.9	117.8	530	395	304	91
316	Comm. refrig. & air cond.	104*	98*	6.7	3.4	$\overline{5}.8$	-6	$\overline{3}6$	56	-93
318	Office & store mach.	-	334	-	C	n/a	n/a	n/a	n/a	n/a

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 7

TEXTILE INDUSTRIES, GROUP #5
MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	ΔN			
183	Cotton yarn & cloth	-	-	-	-	-	-	-	-	-
193	Wool yarn	-	-	-	-	-	-	-	-	-
197	Wool cloth	35*	7*	0.6	0.1	$\overline{8}0.0$	$\overline{2}8$	-38	-9	-28
201	Synthetic tex. mills	-	-	-	-	-	-	-	-	-
211	Fibre preparing mills	-		-	0.8	n/a	n/a	n/a	n/a	n/a
212	Thread mills	-	C	-	C	n/a	n/a	n/a	n/a	n/a
213	Cordage & twine	-	-	-	-	-	-	-	-	-
214	Narrow fabric	-	-	-	-	-	-	-	-	-
215	Pressed & punched felt	-	-	-	-	-	-	-	-	-
216	Carpet, mat & rug	35*	7*	2.0	0.1	$\overline{8}0.0$	-28	-38	54	-92
218	Textile dyeing	-	C	-	C	n/a	n/a	n/a	n/a	n/a
219	Linol & coated fabs.	-	-	-	-	-	-	-	-	-
221	Canvas prods.	74	114	4.4	5.5	54.1	40	18	-5	24
223	Cotton & jute bug	55*	22*	5.4	2.3	-60.0	-33	$\overline{4}9$	-18	-29
229	Misc. textile	376*	314	5.3	2.4	$\overline{1}6.5$	-62	$\overline{1}74$	208	-382

TABLE: 8

FURNITURE & FIXTURES INDUSTRIES, GROUP # 9, MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	ΔN			
261	Household furniture	1070	1277	5.4	5.2	19.3	207	$\overline{1}14$	$\overline{6}4$	$\overline{4}8$
264	Office furniture	33*	18*	1.2	0.4	$\overline{4}5.5$	$\overline{1}5$	$\overline{2}4$	15	$\overline{3}9$
266	Miscellaneous furniture	650*	597	7.1	4.6	-8.2	-53	$\overline{2}47$	82	$\overline{3}29$
268	Electric lamp & shade	65*	54*	5.4	3.8	$\overline{1}6.9$	-11	-30	-6	-23

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 9

MISCELLANEOUS MANUFACTURING INDUSTRIES, GROUP #20, MANITOBA EMPLOYMENT 1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth	Shift-Share			
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	Δ N			
381	Scient. & prof. equip.	83	361	0.8	1.8	334.9	278	253	56	197
382	Jewellry	38	38	0.0	0.0	0	0	0	0	0
383	Broom, brush, mop	143	43*	6.8	0.6	$\overline{9}0.9$	$\overline{1}30$	$\overline{1}72$	$\overline{2}7$	$\overline{1}44$
384	Venetian blind	27	15	7.7	9.2	$\overline{4}4.4$	$\overline{1}2$	$\overline{1}9$	$\overline{2}2$	-2
385	Plastic fabs. n.e.s.	184	129	2.4	0.6	$\overline{2}9.9$	$\overline{5}5$	$\overline{1}09$	250	$\overline{3}59$
393	Sporting goods & toys	15	2*	0.2	0.0	$\overline{8}6.7$	$\overline{1}3$	$\overline{1}7$	3	-19
395	Fur dressing	34	4*	3.5	0.6	$\overline{8}8.2$	$\overline{3}0$	$\overline{3}9$	$\overline{1}9$	$\overline{2}0$
397	Signs & displays	164	350	4.3	6.3	113.4	186	137	22	115
398	Miscellaneous[1]	86*	7*	1.4	0.1	$\overline{9}1.9$	$\overline{7}9$	$\overline{1}04$	0	$\overline{1}03$
399	Miscellaneous[2]	190*	32*	4.7	0.6	$\overline{8}3.2$	$\overline{1}58$	$\overline{2}14$	-5	$\overline{2}08$

[1] Includes:
1) Button, buckle & fastener mfg.
2) Candle mfg.
3) Hair goods mfg.
4) Artificial flower & feather mfg.
5) Model & pattern mfg.
6) Musical instrument & sound recording
7) Typewriter supplies mfg.
8) Pen & pencil mfg.

[2] Includes:
1) Stamp & stencil mfg.
2) Stationery, art goods
3) Umbrella mfg.
4) Artificial ice mfg.
5) Other miscellaneous industries

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 10

PRIMARY METALS INDUSTRIES, GROUP #12
MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	Δ N			
291	Iron & steel mills	829*	868*	2.4	2.0	4.7	39	$\overline{2}09$	$\overline{4}6$	$\overline{1}62$
292	Steel pipe & tube	-	434	-	C	n/a	n/a	n/a	n/a	n/a
294	Iron foundries	316	333	3.9	2.9	5.4	17	$\overline{7}7$	37	$\overline{1}14$
295	Smelting & refining	829*	868*	2.8	2.6	4.7	3.9	$\overline{2}09$	$\overline{1}33$	$\overline{7}6$
296	Alum. roll, cast. & extrud.	-	-	-	-	-	-	-	-	-
297	Copper & alloy roll	415	-	C	-	n/a	n/a	n/a	n/a	n/a
298	Metal roll, casting	418	180	4.4	3.7	52.5	62	27	62	$\overline{3}4$

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 11

PAPER PRODUCTS INDUSTRIES,
GROUP #10, MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	Δ N			
271	Pulp & Paper mills	208*	362*	0.3	0.5	74.0	154	91	-31	124
272	Asphalt roofing	139	242*	7.4	13.8	74.1	103	61	-51	113
273	Folding carbons	652*	595*	3.7	2.5	-8.7	-57	$\overline{2}52$	29	$\overline{2}81$
274	Miscellaneous paper	554*	293	5.7	1.9	$\overline{4}7.1$	$\overline{2}61$	$\overline{4}26$	164	$\overline{5}91$

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 12

CHEMICAL AND CHEMICAL PRODUCTS INDUSTRIES,
GROUP #19, MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	Δ N			
371	Explosives & ammun.	18*	21*	0.4	0.4	16.7	3	-1	-1	0
372	Mixed fertilizer	18*	10*	1.3	0.7	-44.4	-8	-12	-3	-9
373	Plastics & synthetic resins	-	-	-	-	-	-	-	-	-
374	Pharm. & medicines	71*	31*	0.9	0.2	-56.3	-40	-60	26	86
375	Paint & varnish	312	251	5.4	3.1	-19.6	-61	-154	34	-187
376	Soap & cleaning cmpds.	107*	73*	2.6	1.3	-31.8	-34	-65	11	-76
377	Mfgs. toilet preparations	-	10*	-	0.2	n/a	n/a	n/a	n/a	n/a
378	Mfgs. industrial chem.	76	390	0.5	1.9	413.2	314	291	0	293
379	Other chemical ind.	99	104	1.5	1.1	5.1	5	-24	21	-45

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 13

FOOD & BEVERAGES INDUSTRIES GROUP #1
MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	N			
101	Slaugh & meat proc.	2981	2826	11.0	9.7	$\overline{5}.2$	$\overline{155}$	$\overline{1050}$	$\overline{661}$	$\overline{388}$
103	Poultry	-	322	-	4.5	n/a	n/a	n/a	n/a	n/a
105	Dairy products	1515	1354	4.6	4.3	$\overline{10}.6$	$\overline{161}$	$\overline{615}$	$\overline{529}$	$\overline{85}$
111	Fish products	-	242	-	1.3	n/a	n/a	n/a	n/a	n/a
112	Fruit & vegetable	313	763	1.9	3.9	143.8	450	356	$\overline{42}$	399
123	Feed mfgs.	243	585	3.5	6.2	140.7	342	2-9	11	258
124	Flour mills	443	279*	11.2	7.9	$\overline{37}.0$	$\overline{164}$	$\overline{296}$	$\overline{183}$	$\overline{112}$
125	Bkfst. cereal	178*	279*	12.1	19.2	56.7	101	48	-55	104
128	Biscuit mfgs.	134*	372*	2.3	5.4	177.6	238	198	-17	216
129	Bakeries	1694	1219	4.8	3.9	$\overline{28}.0$	$\overline{475}$	$\overline{983}$	$\overline{703}$	$\overline{279}$
131	Confectionary mfgs.	278	159	3.0	1.5	$\overline{42}.8$	$\overline{119}$	$\overline{202}$	-33	$\overline{168}$
133	Sugar Refineries	45*	93*	1.5	3.1	106.7	48	34	$\overline{14}$	49
135	Vegetable oil mills	89*	186*	16.6	28.1	109.0	97	70	-5	76
139	Misc. food	530	1030	4.5	6.3	94.3	500	341	42	299
141	Soft drink mfgs.	359	646	4.6	4.4	79.9	287	179	212	-32
143	Distilleries	-	186	-	3.2	n/a	n/a	n/a	n/a	n/a
145	Breweries	623	659	8.2	7.1	5.8	36	$\overline{150}$	$\overline{53}$	$\overline{96}$
147	Wineries	-	-	-	-	-	-	-	-	-

*Designates those industry groups for which estimation of employment was required.

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 14

CLOTHING INDUSTRIES, GROUP #7
MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1961	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	Δ N			
243	Men's clothing	2920	3543	8.4	8.7	21.3	623	$\overline{254}$	$\overline{371}$	117
244	Women's clothing	1603	2198*	5.1	5.7	37.1	595	113	$\overline{99}$	213
245	Children's clothing	313	362	3.8	4.7	15.7	49	$\overline{44}$	$\overline{111}$	67
246	Fur Goods	436	171	11.9	6.0	$\overline{60.8}$	$\overline{265}$	$\overline{395}$	$\overline{230}$	$\overline{164}$
247	Hat & cap	362*	157	9.2	7.3	$\overline{56.6}$	$\overline{205}$	$\overline{313}$	$\overline{273}$	$\overline{39}$
248	Foundation garment	-	-	-	-	-	-	-	-	-
249	Other clothing	60*	40*	3.3	2.8	$\overline{33.3}$	$\overline{20}$	$\overline{37}$	$\overline{29}$	$\overline{7}$

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 15

WOOD INDUSTRIES, GROUP #8
MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	Δ N			
251	Shingle & sawmills	200	223	0.5	0.4	11.5	23	-36	-17	-18
252	Veneer & plywood mills	C	-	0.1	-	n/a	n/a	n/a	n/a	n/a
254	Sash, door & hardwood mills	626	669	3.6	4.1	6.9	43	$\overline{144}$	$\overline{244}$	79
256	Wooden box factories	132	56*	4.7	1.6	$\overline{57.6}$	-76	$\overline{115}$	-9	$\overline{104}$
258	Coffin & casket	29*	84*	2.1	6.5	189.7	55	46	-9	56
259	Micellaneous wood	73*	148	1.5	2.7	102.7	75	53	-12	66

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 16

PRINTING AND PUBLISHING INDUSTRIES, GROUP #11, MANITOBA EMPLOYMENT 1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	ΔN			
286	Commercial printing	1713	1646	5.3	4.3	$\bar{3}.9$	$\bar{6}7$	$\bar{5}81$	$\bar{1}65$	$\bar{4}15$
287	Plate-making	187	221	3.5	3.3	13.2	34	-21	-8	-12
288	Publishing only	136	131	3.4	2.3	$\bar{3}.7$	-5	$\bar{4}5$	14	$\bar{5}9$
289	Publ. & printing	1772	2127	5.7	6.3	20.0	355	$\bar{1}77$	$\bar{3}97$	221

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 17

LEATHER INDUSTRIES, GROUP #4 MANITOBA EMPLOYMENT 1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	ΔN			
172	Leather tanneries	44*	131*	1.2	4.3	197.7	87	74	-18	93
174	Shoe Factories	220*	263*	1.1	1.3	19.5	43	-22	-76	54
175	Leather glove	236	394*	17.3	24.9	66.9	158	87	-32	120
179	Misc. Leather	37	83	0.7	1.2	124.3	46	35	-3	39

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 18

NON-METALLIC MINERAL PRODUCTS INDUSTRIES
GROUP #17, MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	ΔN			
341	Cement mfgs.	139*	114*	4.5	3.0	$\overline{1}8.0$	$\overline{2}5$	$\overline{6}6$	-11	-54
343	Lime mfgs.	76	51*	9.2	8.1	$\overline{2}5.0$	$\overline{1}9$	-41	-33	-7
345	Gypsum products	277*	114*	17.3	7.3	$\overline{5}8.8$	$\overline{1}63$	$\overline{2}45$	$\overline{9}0$	$\overline{1}54$
347	Concrete products	472	446	5.7	4.5	$\overline{5}.5$	-26	$\overline{1}67$	-46	$\overline{1}20$
348	Ready-mix concrete	162	339	4.0	4.5	109.3	177	128	88	40
351	Clay products	62	36	1.2	0.7	$\overline{4}1.9$	-26	-44	-15	-27
352	Refractories mfgs.	-	-	-	-	-	-	-	-	-
353	Stone products mfgs.	71	10	6.5	1.5	$\overline{8}5.9$	-61	81	-48	-33
354	Mineral wool mfgs.	-	-	-	-	-	-	-	-	-
355	Asbestos products	-	C	-	C	n/a	n/a	n/a	n/a	n/a
356	Glass & glass products	81	119	0.9	1.0	46.9	38	14	0	15
357	Abrasives mfgs.	-	-	-	-	-	-	-	-	-
359	Other non-metallic minerals	21	114*	4.4	15.3	442.9	93	87	5	81

TABLE: 19

KNITTING MILLS INDUSTRIES, GROUP #6
MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba		Size in National Industry		Growth		Shift-Share		
		1961	1969	1961	1969	1961-1969	1961-1969	NRC	IM	CE
				%	%	%	ΔN			
231	Hosiery mills	64*	C	0.8	C	n/a	n/a	n/a	n/a	n/a
239	Other knitting mills	64*	C	0.5	C	n/a	n/a	n/a	n/a	n/a

TABLE: 20

RUBBER PRODUCTS INDUSTRIES, GROUP #3
MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba 1961	Size in Manitoba 1969	Size in National Industry 1961	Size in National Industry 1969	Growth 1961-1969	Growth 1961-1969	Shift-Share NRC	Shift-Share IM	Shift-Share CE
				%	%	%	Δ N			
161	Rubber footwear mfgs.	-	-	-	-	-	-	-	-	-
163	Rubber tire & tube	-	C	-		n/a	n/a	n/a	n/a	n/a
169	Other rubber	34*	C	0.5	C	n/a	n/a	n/a	n/a	n/a

TALLE: 21

PETROLEUM & COAL PRODUCTS INDUSTRIES,
GROUP # MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba 1961	Size in Manitoba 1969	Size in National Industry 1961	Size in National Industry 1969	Growth 1961-1969	Growth 1961-1969	Shift-Share NRC	Shift-Share IM	Shift-Share CE
				%	%	%	Δ N			
365	Petroleum refining	491*	C	3.6	C	n/a	n/a	n/a	n/a	n/a
369	Other Petroleum & coal	69*	C	12.7	C	n/a	n/a	n/a	n/a	n/a

*Designates those industry groups for which estimation of employment was required

Source: EDAB Shift-Share Analysis, Oct. 1975

TABLE: 22

TOBACCO PRODUCTS INDUSTRIES, GROUP #2
MANITOBA EMPLOYMENT
1961 - 1969

SIC No	Industry	Size in Manitoba 1961	Size in Manitoba 1969	Size in National Industry 1961	Size in National Industry 1969	Growth 1961-1969	Growth 1961-1969	Shift-Share NRC	Shift-Share IM	Shift-Share CE
				%	%	%	Δ N			
151	Leaf Tobacco Processing	-	-	-	-	-	-	-	-	-
153	Tobacco Products Mfgs.	-	-	-	-	-	-	-	-	-

Source: EDAB Shift-Share Analysis, Oct. 1975

FORECASTING RELATIVE STRUCTURES
IN MANUFACTURING BY PROVINCE
A POLICY EVALUATION

A Report: For The
Economic Development
Advisory Board

by Dr. P. L. Wahi*

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PART I

Quantitative Modelling Regional Development:

Description and Appraisal

A) Summary

The two major purposes of regional analysis are:
a) to identify various industrial units for their economic viability together with the associated employment levels afforded by these units and b) to project into the future the employment levels expected of the industrial units. The latter consideration which is of much consequence for policy requires that careful evaluation be given to the techniques available to obtain these estimates. The purpose of Part One of this paper is to describe and appraise five such techniques.

Of the five analytical techniques considered, Shift-Share (SS) analysis is of critical significance and is appraised accordingly. As will be seen later, SS analysis is a controversial technique in regional analysis. The model has been used here to classify various production units with an eye on the limitations of the technique. Intersectoral flows (I Sec) analysis is described here for usefulness of the technique. This is a relatively new development in regional analysis. Though the model is capable of providing major inferences for planning purposes, it has not yet seen many applications due to special data set requirements. The Hybrid model which is a combination of SS and I Sec models lacks empirical application and its theoretical foundation appears to need further development. Markov Chains is a widely known technique in quantitative estimations and is described in one of its basic forms. Regression analysis which is a highly regarded versatile technique for estimation and/or prediction situations is also discussed for a possible application. The five techniques are discussed separately in the following pages for their general properties of interest, limitations, and any significant usefulness for the analysis considered.

B) Shift-Share Analysis

The 'SS' model analyses performance of the regional economy considered influenced by the national and the regional economic environment. Traditionally, the regional economy profile is studied in terms of its various component industrial units. Historical performance of each unit is separated into two parent influences: national and regional economic influences. In other words, for a particular unit, growth over a particular time period is broken into two components: (a) change due to national economic environment, and (b) the change brought about by regional advantage. This is expressed alternatively in the algebraic model presented below. The break down into national and regional growth-inducing (growth affecting) components has been the basis to distinguish economically sound industrial units from relatively less viable or marginal units.

Economic growth is a complex behavioral phenomenon measured in various ways by researchers. However, regional economic performance has been commonly studied in terms of employment levels afforded by various units and, thus, by the regional (industrial) sector. Alternative measurement variables considered may be: volume of production, sales level,value added, and several others. Employment level is expected to be highly correlated with these variables. Also, since employment level is of major consequence for socio-economic and political considerations, the SS model below is described in terms of employment levels.

For a region j,

$$e_i^t = e_i^o + \Delta e_i \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

and $\Delta e_i = (e_i^t - e_i^o)$

$$= e_i^o \, (N^t/_{N^o} - 1) + e_i^o \, (N_i^t/_{N_i^o} - N^t/_{N^o})$$

$$+ e_i^o \, (e_i^t \,/\, e_i^o - N_i^t/_{N_i^o}) \quad \dots\dots\dots\dots\dots\dots\dots (2)$$

Where,

e refers to the regional employment level,
N refers to the national employment level,
Δ refers to the level change during a specified period,
subscript i refers to industry i,
superscript o indicates beginning of period level,
superscript t indicates end of period level.

Thus, e_i^t = regional employment level in industry i at the end of the period,

$e_i^o \, (N_i^t - N^t/_{N^o})$ is known as the industry mix component

$e_i^o \, (e_i^t/e_i^o - N_i^t/N_i^o)$ is known as the competitive or regional share component.

Regional level employment at the end of period t is the sum of base period level and of the level change as shown in equation (1).Regional level change is further defined as the sum of three influences: national growth rate, national industry growth rate (industry mix), and the residual competitive or regional share, as shown in equation (2). For prediction estimates, equation (2) uses anticipated employment rate changes for national growth and for national industry growth components; the regional share component estimate is an extrapolation from the historical regional trend.

Some insights into the mechanics of SS analysis, particularly its competitive component are revealed by H. James Brown("Shift-Share Projections of Regional Economic Growth: An Empirical Test", Journal of Regional Science, 1969). Brown warns against the use of technique as a major analytical tool as a result of his empirical work. He found the competitive component to be unstable and inconsistent with various levels of disaggregation. As a result, the national growth rate of an industry was shown to provide a better base for a projection of the regional growth of that industry than was the historical regional industry growth rate.

David B. Houston ("The Shift and Share Analysis of Regional Growth: A Critique " Southern Economic Journal, 1967) is equally critical of the technique due to lack of theoretical validity and some of the other reasons mentioned by Brown. Weaknesses of the method have also been cited by Davis and Goldberg("Combining Intersectoral Flows and Shift-Share Techniques: A Hybrid Regional Forecasting Model"). These and some other possible weaknesses of the technique are summarized below:

1. It lacks theoretical validity; the equation which is the foundation of the model is a mathematical identity and is empty of any behavioral content.

2. In Brown's empirical work, it had poor projection performance, as tested by Theil's Inequality Coefficient, in comparison to other simple projection models.

3. The Competitive Component, considered to be the crucial factor in explaining regional performance, is obtained as a residual in the estimation process. Also the component was found by Brown to be unstable with large variance and lacked consistency as the degree of disaggregation changed. Thus

it may not be considered a useful tool for prediction. Results could be misleading for planning decisions.

4. References to national figures as a bench-mark may not always be justified especially when regional industry lacks national dimensions. Thus, the national trend appears to be overemphasized in assessing the regional performance.

On the other hand, the technique has a few favorable considerations which are:

1. It is a convenient tool to analyze large and descriptive data panels.
2. It provides an alternative format to organize data.
3. Despite the above criticism, the method has been used to obtain regional growth projections, to delineate strengths and weaknesses of the regional economy, and thus has been used as an aid to policy formulation.

C) Intersectoral Flows Analysis (I Sec.)

The I Sec. Analysis is a static allocation model. Unlike other models discussed here, I Sec is not used for commonly understood projection purposes. But the efficacy of the technique lies in the fact that it provides a framework for sensitivity analysis of industry (or production unit) employment levels subject to final demand changes.

The model has the following general characteristics. First, only the output of regional industries are surveyed; inputs are ignored. Second, final output is allocated to an arbitrary number of final demand sectors via inter-industry flows of output. Third, assuming high correlation between output and employment, only employment figures are used. Thus output is defined in terms of employment opportunity provided by the industry.

Once the model has been built, the significance of changes in final demand levels can be traced back to indicate the resultant employment level changes at the industry level: Also, the economic base (foreign trade) multipliers can be calculated and inter-industry employment input coefficients can be generated.

Two forms of the model were used by W. Lee Hansen and Charles M. Tiebout ("An Intersectoral Flows Analysis of the Californian Economy", Review of Economics and Statistics, 1963). One form (Model I) considered intermediate sectors separate from final demand sectors such that the employment in an industry i (for a given region) is as follows:

$$e_i = \sum_j e_{i_j} + \sum_k e_{i_k}$$

$$\text{where } i = j = 1, \ldots, n$$
$$k = 1, \ldots, k$$

Inter-industry employment input requirements are stated in the 1st term on the right hand side of the equation (R.H.S.) and the industry employment relation with final demand sectors is expressed in the 2nd term.

In the second form (Model II), $\sum_j e_{i_j}$ is collapsed into $\sum_k e_{i_k}$ such that employment in industry i is traced to the final demand sectors:

$$e_i = \sum_k e_{i_k} \quad (\text{all } e_{i_j} \text{ is converted to } e_{i_k})$$

In other words, all employment in each industry, is converted to final demand sector requirements. Hansen and Tiebout considered seven final demand categories, 20 manufacturing industry groups, and 9 "all industry" sectors; regional employment figures for 1959 were used. Inter-industry employment input coefficients were obtained by allocating total employment in an industry among various groups or sectors according to its final sales dollar sources.

Apparently, given some reliable projection estimates on final demand categories, the technique is capable of generating useful information for planning reference. Other desirable characteristics of the technique are listed below:

1. Empirical estimates of industry employment level changes due to government policy changes can be obtained.
2. Data requirements are rather modest as compared to those of some other techniques available for similar inference.
3. The economic base (foreign trade) multipliers (or employment multipliers) is a convenient parameter to obtain quantitative estimates on employment level changes due to shifts in final demand.

4. It provides a more complete specification of regional economic base in terms of production and consumption sectors.

5. Being a deterministic model, it requires little behavioral content and thus attracts little controversy.

A word or two of caution appears is in order, as always, in spite of favourable ratings of the model:

1. Being a static model, results of the technique are based on cross-section data. Unless the point of reference is chosen carefully, erroneous inferences could be drawn.

2. It lacks the cross-check mechanism of input-output analysis and thus needs extra care in processing the data to avoid "oversight" errors.

3. Final sale figures, if used directly would likely add to data expense and lead to complicated accounting problems. (e.g. multiple counting). However, the use of employment levels alleviates these problems conveniently.

D) Hybrid Model

The hybrid model by Davis and Goldberg (see above, p.258) combines the SS and the I Sec models plus regression analysis and is an attempt by authors to overcome weaknesses of the models employed. The SS analysis provides projection estimates of Hansen-Tieout "final demand" categories. These forecasts are then used as input to the I Sec model to obtain employment level estimates for the (regional) industrial units. The use of regression analysis is proposed as an alternative to the competitive-component of the SS model to obtain regional growth rate estimates for each industry. The Hansen-Tiebout I Sec Model II, (described previously) that converts all indirect employment coefficients to direct figures, together with other concepts stated therein, is employed by Davis and Goldberg.

The hybrid model is summarized partly in the algebraic equations presented by the authors just cited. They list nine equations and the second half of these nine appear to be repetitive except for the suggestion of a behavioral element.

The model begins by defining the employment level in an industrial unit i at time period t, due to final demand category k (for a region):

$$e_{it} = \sum_{j} e_{ijt} + \sum_{k} e_{ikt} \ldots\ldots\ldots\ldots\ldots (1)$$

as equal to the sum of indirect employment (i.e. the inter-industry employment input requirement) and the direct employment in the industrial unit for (Hansen-Tieout) final demand categories.

$$e_{ikt} = \left(1 + r_{ik\ (t-1)}\right) e_{ik\ (t-1)} \ldots\ldots\ldots\ldots (2)$$

where, r is the employment growth rate in final demand category k, for industrial unit i in period (t-1)

Also,

$$r_{ikt} = f^{ikt} \text{ (pollution, density, and other externalities)}. \ . \ .(5)$$

In other words, the employment growth rate r_{ikt} is dependent on factors external to the regional production unit i. Now, (2) can be rewritten:

$$e_{ikt} = \left(1 + f^{ik,\ t-1}\right) e_{ik,\ t-1} \ldots\ldots\ldots\ldots (6)$$

or, $$e_{ikt} = \left(1 + f^{ik\ to}\right)^{t} r_{ik\ to} \ldots\ldots\ldots\ldots (7)$$

Equation (7) is solution to the difference equation (6). Regional growth rate r_{ikt} is formulated in the behavioral function (5). The estimate thus obtained is used in (7) in an effort to overcome Brown's major criticism of SS analysis.

Indirect employment (inter-industry employment) input requirement for final demand category k is converted to direct employment figures in equation (3): Total employment in unit i for category k

$$e^{T}_{ikt} = e_{ikt} + \left[e_{ikt} \left(\frac{e_{ij,\ t-1}}{e_{ik,\ t-1}} \right) \right] \ldots\ldots (3)$$

Indirect employment in each industrial unit i is converted into direct employment for category k by the proportion of indirect input to the direct input for category k in previous period and multiplied by the unit i direct employment for category k in current period. Thus total employment in industrial unit i for category k is the sum of direct employment for the category and the indirect employment converted to direct employment for the category.

Substituting for e_{ikt} from (7) into (3),

$$e^{T}_{ikt} = \left(1 + f^{ik\ to}\right)^{t} e_{ik\ to} \left[1 + \frac{e_{ij\ to}}{e_{ik\ to}}\right] \quad . \ . \ . \ . \ . \ . \ (8)$$

The total employment defined in (3) is alternatively expressed in (8) with some behavioral input. Equations (4) and (9) are identical and represent total employment in unit i at time t due to each of k final demand categories:

$$Eit = \sum_{k} E_{ikt} \quad . \ (9)$$

Employment level forecasts into the future for each industrial unit can be obtained based on final demand category forecasts. Inter-industry employment input coefficients and the direct employment input coefficient matrix would be assumed fixed ,based on historical data. Also indirect employment ratios would likely be assumed constant.

The authors did not report any empirical tests on the model. It can be assumed that either the model is not operative as it stands now or that there might have been problems in obtaining the needed data. A combination of both is more likely. Behavioral formulation of regional growth rate is not specified and there is no mention of a likely methodology that could be useful in obtaining these estimates. It can be visualized that usually the behavioral formulation would yield estimates with large confidence intervals. Prediction of externalities into the future would be needed to obtain forecasts from the hybrid model. These predictions decrease the likelihood of realization of hybrid model forecasts.

The underlying idea of obtaining final demand category forecasts and working these backwards to production unit employment levels appears reasonable. As pointed out previously, however, the SS model is not an efficient or desirable technique for any serious forecasts. Since the hybrid model results are based on reliability of demand category forecasts, it would be worthwhile to look for a relatively more efficient prediction model. Markov Chains and Regression analysis are two of the more widely used sohisticated prediction techniques. Time series analysis could provide an alternative prediction capability but is much less efficient.

E) Markov Chains

This technique is useful in characterizing or summarizing the historical growth pattern of economic processes or of institutions and the likely future path of the processes can also be obtained. Much literature is available on the subject and a comprehensive review could not reasonably be presented here. However, a brief description of a simple Markov Chain model is in order.

A Markov Chain process is determined by specifying the following information: There is given a set of states ($S_1, S_2, \ldots S_r$). The process can be in one and only one of these states at a given time but it can move successively from one state to another. Each move is called a step. The probability that the process moves from S_i to S_j depends only on the state Si that it occupied before the step. The transition probability p_{ij} which given the probability that the process will move S_i to S_j is given for every pair of states. Also an initial starting state is specified at which the process is assumed to begin (see J. G. Kemeny et al., Finite Mathematical Structures, Prentice hall, New York 1959).

The transition probabilities p_{ij} can be written in a matrix form as follows.

$$P = \begin{array}{c|cccc|} & S1 & S2 & .\;.\;.\;. & Sr \\ S1 & P_{11} & P_{12} & .\;.\;.\;. & P_{1r} \\ S2 & . & . & & . \\ . & . & . & & . \\ . & . & . & & . \\ . & . & . & & . \\ . & . & . & & . \\ Sr & P_{r1} & P_{r2} & & P_{rr} \end{array}$$

where $$\sum_{j=1}^{r} Pij = 1$$

and $P_{ij} \geq o$ for all i and j

The chain is known as irreducible if all $p_{ij} > o$, and a non-zero probability of moving from one state to another. A sufficient condition for P to be irreducible is that the matrix P be positive definite. If this condition is met, the transition matrix P defines a Markov Chain which is regular.

A state in a Markov Chain is an absorbing state if it is impossible to leave it; or $p_{ij} = 1$ when $i = j$. A Markov Chain is absorbing if (1) it has at least one absorbing state and (2) from every state it is possible to go to an absorbing state.

Two theorems relating to existence and uniqueness of the solution are:

Theorem 1: If P is a transition matrix for a regular chain, then:
(a) p^n approaches a matrix T,
(b) each row of T is the same probability vector w,
(c) the components of w are all positive.

Theorem 2: If P is a transition matrix for a regular chain and T and w are as defined above, then the unique vector w is the unique probability vector such that

$wP = w$

Also, since w is a probability vector

$$\sum_{j} wj = 1$$

The basic concepts of Markov Chains presented above would suffice in obtaining an equilibrium solution vector. Otherwise a solution short of the equilibrium can be obtained. For example, it might take 20 years for the process to reach equilibrium, but we might be interested in state or states at the end of '20 - n' years and thus a solution short of equilibrium would be desired. Given the elements of transition matrix whose elements represent the conditional probability that an industry will go to state j if it moves out of state i. The elements of this matrix can be obtained.

$$m_{ij} = \frac{p_{ij}}{1-p_{ii}}$$

In Part II we will adopt this technique to study the structure of historical patterns of changes in regional development and also the long run consequences if the structure is maintained.

F) Regression Analysis

Regression analysis is most commonly used in the general area of economics for two main purposes: (a) prediction, and (b) structural estimation. Regression model formulation is guided by the purpose sought by the researcher. A causal relationship assumption is basic to the model. There are a few other vital assumptions the model would need for reliable results. A regression model for prediction purposes can be considered a little less restricted than one forumlated for structural estimation. The equation below represents the general formulation of the model (in matrix form):

$$y = b^{1}x + e$$

where

$y = T \times 1$ dependent variable column vector

T = number of observations

$x = (k + 1) \times T$ explanatory variable matrix

$b = k + 1$ unknown coefficient vector

e represents residual effect (or unexplained residual)

Some better known assumptions that belong with the model are:

1. b is a fixed coefficient vector
2. X's are non-stochastic and known
3. $e^{1}e = \sigma^{2} I$ This expression represents two restrictions on the model (a) constant variance within the sample (the sample is homoscedastic) and (b) independence of explanatory variables (no multicollinearity).

As the technique has been in use widely for several years now, most problem areas have been worked out and as a result the technique is flexible and generally adaptable to varied problems in economics or elsewhere.

Davis and Goldberg proposed application of ordinary least squared regresson (OLS) in their hybrid model to obtain regional growth rate estimates. Regression analysis would be helpful in obtaining estimates on regional parameters as long as (a) a reasonable model is available to spell out causal relationships, (b) reliable data are available and (c) a homogeneous set of observations could be obtained. Because of the causal relationship assumption that the analysis is based on, only a small number of variables can be examined at a time and these variables must represent a phenomenon which is quantifiable. Unlike SS analysis or the I Sec model, OLS would look into the set of information one unit at a time. The information could be assembled only for an industry or for the national economy in aggregate. SS analysis and the I Sec model are supposedly capable of separating out weaker and stronger sections of a regional economy but this is not a property of OLS analysis. On the other hand, OLS has explanatory power with respect to the performance of a segment of economy or of the entire economy. The results obtained from OLS are efficient and credible since the estimated coefficents have desirable mathematical properties. All the other models discussed do not have this capability or the credibility. Finally, it must again be noted that OLS analysis is restricted by the assumption requirements and the data needs.

Given the identification of weak and strong industrial segments of the economy (from shift-share and Intersectoral flows models), regression analysis could be used to explore factors which explain the relative strengths and weaknesses of the segments of major concern. Otherwise, the OLS analysis could be used to study economy segments of particular interest for policy formulation. Final demand sector projections needed for I Sec analysis may be obtained from regression analysis. This would likely enhance reliability of production unit employment level estimates.

PART II

Markov Chains Inference

A) Introduction

Estimates on the relative level of manufacturing activity anticipated for each province are obtained and presented in this part of the paper. Historical data for the period 1961 - 1969 were used to construct the transition matrices. The data were divided into three time periods for continuation of transition matrices. These periods were 1961 to 1965, 1965 to 1969 and 1961 to 1969. Only the last of these periods appear interesting for analysis purposes. Also, the manufacturing sector was defined at two levels of aggregation: the three digit level of the Standard Industrial Classification Code (S.I.C.) consisting of 188 industry classes and the two-digit S.I.C. level consisting of 20 industrial groups. The two levels supposedly contain identical information except for the level of aggregation and some missing information on 188 industry classes. As mentioned previously, industrial activity was measured by the level of employment in the industrial units. Also, the activity was measured by the value added figures for comparison purposes.

Before the results and inferences are presented it is desirable to describe some background information to put the analysis in perspective. This information is intented to point out some major economic environment differences between the study period (1961 - 1969) and the projections period (post 1969). First, there were changes in government in Manitoba and in Ottawa in 1969. Economic policy changes brought about by these administrations reflect a significant deviation from policies pursued in the 60's.

Second, energy prices increased since 1972 and the agricultural product price instability in recent years have disrupted the long chain of traditional factor/product price relationships that had prevailed in the market place. Also inter-product price relationships appear to be undergoing major revisions (as a result of national and international political events). An unsettled economic environment increases the risk and the uncertainty elements in decision making at micro as well as macro levels. Thus, short run decisions would expectedly be emphasized at the cost of long term planning by the firms. Depressed economic activity in international markets is in contrast to the stable markets of 60's that realized the economic boom. Manitoba's economy is variously linked to national and international markets and is affected by the economic environment prevailing in these markets.

Third, advances in communications technology in recent years have brought various international markets closer together and thus each market is now more likely to be vulnerable to changes in other markets than previously.

Fourth, compared to the 1960's the manufacturing sector is more closely scrutinized now by environmental, business ethics, consumer action, and other interest groups. These elements increase the entry restrictions for new firms to any industry. On the other hand, these new restrictions appear to be offset by industry support programs and promotional services that have been introduced in recent years at both the provincial and the federal levels of government. The entry environment in business, nevertheless, has changed significantly in recent years.

Considering the prevailing economic influences, removed as these are from the expansion era of 60's, two significant inference aspects emerge from the projection estimates obtained using the 1961-69 data. First, since the projections are a reflection of economic policies and other economic influences prevailing during the 60's, the end results of these policies can be seen in the obtained projections and in the equilibrium vector. Thus we find out if the economic influences during the 1960's in Manitoba were more favorable for the attraction of industrial activity to the province from a long run point of view as compared to the influences prevailing in other regions.

Second, the current level of industrial activity in the province can be compared to the projected path. The general desirability of the current economic environment in the province can thus be assessed. The comparison would also give some indication as to whether or not, the provincial policies pursued in recent years were in an appropriate direction to help promote industrial activity relative to other provinces.

B) Results

A transition matrix is an array of probability figures for the likelihood of various processes (provinces) to fall into various designated states (growth performance). In other words, the likelihood of each province to display employment growth performance of each of the other provinces is obtained in a transition matrix. Movement towards equilibrium is guided by the transition matrix elements. An equilibrium is reached when none of the processes (i.e.provinces) show any tendency to leave the solution reached.

Table I below contains historical data which indicate the relative level of manufacturing acitivity (employment basis) among provinces since early 50's, plus the anticipated figures for 1975 and the equilibrium vector (reached shortly after 1975).

TABLE I

Provincial Share of Manufacturing Employment in Canada - Historical and Projected*

	Historical						Projected			
	1952 %	1955 %	1961 %	1965 %	1969 %	1973 %	1975 %	Equilibrium 1980 (or earlier) %	End Position	
									Actual	Projected
Newfoundland	0.8	0.8	0.7	0.7	0.7	0.8	1.126	1.126	Gain	Gain
P.E.I.	0.1	0.1	0.1	0.1	0.2	0.1	.310	.310	Loss	Gain
Nova Scotia	2.6	2.3	2.1	2.0	2.0	2.1	2.994	2.994	Gain	Gain
New Bruns.	1.9	1.7	1.7	1.2	1.7	1.7	2.583	2.583	No Gain	Gain
Quebec	33.4	33.1	33.5	31.8	31.6	30.5	23.705	23.705	Loss	Loss
Ont.	47.3	47.3	47.2	49.2	49.3	49.2	55.095	55.095	Loss	Gain
Man.	3.4	3.2	3.1	3.0	3.0	3.0	2.340	2.340	No Loss	Loss
Sask.	0.9	0.9	1.0	1.0	0.8	1.0	.829	.829	Gain	Gain
Alta.	2.5	2.7	2.9	2.9	3.1	3.2	3.696	3.696	Gain	Gain
B.C.	7.2	7.9	7.7	7.6	7.5	8.3	7.320	7.320	Gain	Loss

* The 1975 projected shares and the equilibrium shares are based on the transition matrix for 1961-1969 at the group level of aggregation.

Since the early 1950's, Manitoba has not kept pace with the gains in industrial activity by other provinces. As a result Manitoba's national share of manufacture activity declined until recently when its share stabilized, (i.e. it kept pace with development in other provinces). This actual performance can be considered a marked improvement compared to the predicted major loss for the province. The Table also provides some interesting insights into the performance of other provinces. Historically, Ontario has grown relatively in terms of employment. Also, this province was projected to accelerate this trend between 1969 and 1975 (from 49.3% in 1969 to 55.1% in 1975). However, 1973 figures show that the trend apparently levelled off for Ontario had 49.2% of employment in that year which is slight decline from 49.3% for 1969.

On the other hand, Quebec was projected to perform badly in the competition for manufacturing activity; from 31.6% in 1969, it was projected to drop to 23.% in 1975. However, the historical slide for the province apparently stopped for it still had 30.5% of manufacturing employment in 1973. This is a significant drop of over one percentage point but it is much less than the expected drop of 8 percentage points by 1975. Alberta has experienced steady gain in industrial activity since the 1950's and is apparently continuing on the path of additional gains if at a somewhat slower pace than projected. Saskatchewan has shown marginal ups and downs during this period and was expected to improve somewhat in the 1970's compared to its 1969 share of manufacturing. However, the actual 1973 figure shows that the province did much better than expected (1.0% of manufacturing employment in 1973 compared to the 0.83% figure projected for 1975). British Columbia has been declining relatively since 1955 (7.9% compared to 7.5% in 1969) and was projected to stabilize at 7.3% by 1975. But the recent figure of 1973 (8.3%) shows a major relative gain during recent years. Among the Maritimes, Nova Scotia and New Brunswick have lost historically but both were projected to improve their position. This projection conforms with the 1973 observations. Also, P.E.I. and Newfoundland are projected for marginal gains. This agrees with the actual Newfoundland observation for 1973. P.E.I., on the other hand, apparently slipped further since 1969 and is not likely to show the projected improvement.

As discussed earlier, deviations from the projections can be interpreted to be at least partly due to major policy shifts at the national and provincial levels of government. However, the extent of exposure of provincial economy to international markets is inversely linked to its predictability into the future and thus weakens the explanatory power of shifts in government policies.

On value added basis, the general direction of projected path is same as by employment basis for most provinces but the magnitude differs due the changed basis (see Table II). Manitoba is projected to slip from 2.3% of national manufactures activity in 1969 to 2.0% in 1975. In contrast to the employment basis, Manitoba apparently has done much better than anticipated by maintaining its relative share of 1969 (2.3%). Ontario was projected to increase its share from 54.2% in 1969 to 56.5% in 1975. Quebec was expected to slip from 28.1% to 25.1% during the period. In contrast to the employment basis, manufacturing activity in Saskatchewan was projected to slip on a value added basis from 0.78% to 0.74%. Similarly, British Columbia was projected to increase its share from 8.4% to 8.9% on a value added basis during the period. Recent observations on actual provincial performance are not readily available for comparison purposes.

It might be added here that value added figures cannot be easily converted to resulting employment changes. It is possible that an increased share on a value added basis can result in a decreased employment share for a region; it can also happen the other way around, depending on the change in industry-mix of a province.

A word of caution is in order in interpreting the three digit level results. Data are missing on many industry classes for most provinces due to the confidentiality requirements of the census. Smaller provinces are under-represented because of greater likelihood of missing data for industry classes. It appears that no data were missing for Ontario and Quebec but all other provinces had data missing for one or more industries. Due to incomplete information over the years, projected trends are not reliable and may conflict with prior information. For example, Manitoba is projected to increase its share on an employment basis, from 2.32% in 1969 to 4.05% in 1975. This projectic suffers from release of data for more industrial classes over the years.

TABLE II

Provincial Share of Manufacturing Activity in Canada,

Value Added Basis: 1969 and Projected Equilibrium (1961-1969, 20 Groups)

	Projected 1975	Observed 1969
Newfoundland	0.0049	0.0037
Prince Edward Island	0.0008	0.0007
Nova Scotia	0.0148	0.0120
New Brunswick	0.0126	0.0127
Quebec	0.2511	0.2807
Ontario	0.5646	0.5421
Manitoba	0.0200	0.0231
Saskatchewan	0.0074	0.0078
Alberta	0.0345	0.0333
British Columbia	0.0893	0.0839

TABLE III

Projected Provincial Share of Manufacturing Activity:
Employment and Value Added Bases (1961-1969, 188 Industries)

	EMPLOYMENT		VALUE ADDED	
	Actual	Projected	Actual	Projected
	1969	1975	1969	1975
Newfoundland	0.0060	0.0079	0.0042	0.0032
Prince Edward Is.	0.0011	0.0035	0.0005	0.0009
Nova Scotia	0.0129	0.0109	0.0089	0.0089
New Brunswick	0.0115	0.0094	0.0086	0.0066
Quebec	0.3226	0.2963	0.2807	0.2688
Ontario	0.5179	0.5050	0.5660	0.5676
Manitoba	0.0232	0.0405	0.0180	0.0202
Saskatchewan	0.0076	0.0099	0.0074	0.0070
Alberta	0.0263	0.0416	0.0270	0.0313
British Columbia	0.0708	0.0748	0.0784	0.0853

Thus historically, according to this set of information, Manitoba increased its share whereas on basis of complete set of information the provincial share might have declined. We will not pursue this table any further.

Conclusions

Manitoba has stopped its decline in its relative share of employment in manufacturing. The decline started at least as far back as 1952 and levelled off by 1973. The projected decline may have been averted by the fact that the early 1970's were recessionary times and Manitoba traditionally performs well in a relative sense in such times. However, if provincial-federal industry support programs continue to provide a favorable environment for location and expansion of industry in the province the probability is good that the projected decline will continue tc be averted. It cannot be ascertained from the data if an upward trend is in the making for relative provincial share of manufacturing employment. On the other hand, Ontario, a projected major winner (6 point increase in relative share by 1975) barely held on to its 1969 share of 49.3% as observed in 1973. Quebec, a projected 8 point loser, lost only one point by 1973 and apparently averted a major projected loss. British Columbia gained relatively against projected loss. Among Prairies and Maritimes,most gained marginally, as projected.

Among various factors slowing down Ontario growth, environmental considerations might be a major factor. Also, the phenomenal expansion of the service sector in recent years would likely help explain the levelling off in Ontario manufactures.

Further inquiry into the economic viability of production units appears desirable. These units may be studied in terms of the employment levels afforded and the levels anticipated over short and long terms. Sensitive areas in industry should be identified. This information may prove to be a useful provincial planning reference and would provide additional insights into the industry to help stimulate growth and employment. Industrial activity is a vital sector of the economy but not complete by itself. Similar analyses on service sector, construction, and possibly into other sectors would provide a rather comprehensive view of the intersectoral relationship and trends in the economy.

Appendix I: Relative Share of Manufactures Among Provinces - EMPLOYMENT BASIS (20 Indus. Group)

Data Set Period:	1961 - 1965		1965 - 1969	
	Projected 1970	Actual 1965	Projected 1975	Actual 1969
Newfoundland	0.0094	0.0051	0.0061	0.0052
Prince Edward Is.	0.0000	0.0001	0.0053	0.0012
Nova Scotia	0.0445	0.0209	0.0106	0.0177
New Brunswick	0.0216	0.0180	0.0123	0.0166
Quebec	0.2358	0.3500	0.2349	0.3188
Ontario	0.5504	0.4734	0.5461	0.4974
Manitoba	0.0227	0.0343	0.0149	0.0293
Saskatchewan	0.0168	0.0102	0.0043	0.0078
Alberta	0.0303	0.0312	0.0300	0.0302
British Columbia	0.0684	0.0568	0.1358	0.0758

Appendix II - Relative Share of Manufactures Among Provinces - Value Added Basis (20 Indus. Group)

Data Set Period:	1961 - 1965		1965 - 1969	
	Projected 1970	Actual 1965	Projected 1975	Actual 1969
Newfoundland	0.0042	0.0032	0.0043	0.0037
Prince Edward Is.	0.0000	0.0000	0.0015	0.0007
Nova Scotia	0.0213	0.0143	0.0093	0.0120
New Brunswick	0.0137	0.0153	0.0093	0.0127
Quebec	0.2885	0.3220	0.2233	0.2807
Ontario	0.5347	0.4995	0.5976	0.5421
Manitoba	0.0216	0.0285	0.0157	0.0231
Saskatchewan	0.0118	0.0104	0.0048	0.0078
Alberta	0.0346	0.0370	0.0292	0.0333
British Columbia	0.0697	0.0697	0.1050	0.0839

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